Discrete semiconductors selection guide 2015

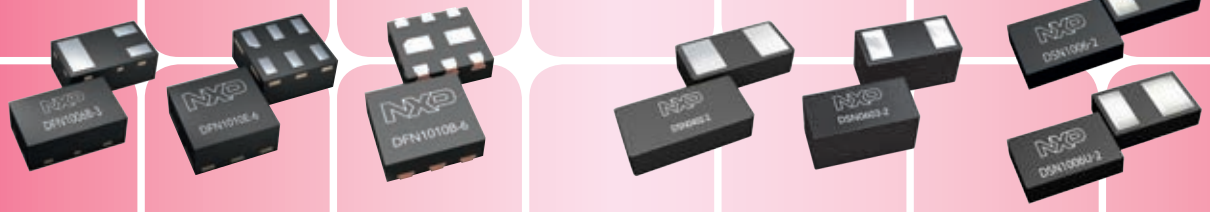
Bipolar transistors, diodes, ESD protection, filtering and signal conditioning, MOSFETs, and thyristors

The next generation of packaging

DFN / DSN packages – high performance on a smaller footprint

100% solderable side pads
- Improved electro-thermal behaviour
- For visual solder inspection

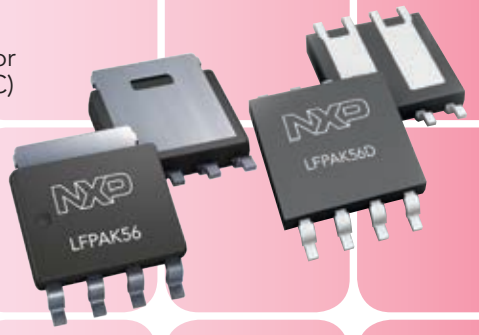
Heat sink at die pad
- For high power on a small footprint
- Enabling smaller designs



Smallest packages
- Outline down to 0.4 x 0.2 mm
- Height down to 0.12 mm
- For ultra-compact and slim designs

True power packages for smart efficiency – with solid wireless-clip design

The miniaturization of power
- Only 1 mm in height
- Excellent electro-thermal behavior
- For high-temperature use (175 °C)



FlatPower: CFP15 (SOT1289)
SOD128 / SOD123W
- Same performance as SMA / SMB on a much smaller footprint

LFPAK56/56D (SOT669 / SOT1205)
- Same performance as DPAK, on a much smaller footprint

Discretes semiconductors selection guide 2015

Benefit from interactive features in the online edition of this selection guide: A click on a product type takes you to the corresponding product information page on the NXP website. There you'll find data sheets and other design-support documents. To access the online selection guide, go to www.nxp.com/discrete_selection_guide

Our extensive package range provides maximum flexibility

Miniaturization >> **Medium Power**

2 Pins

DSN0402 (SOD992) 0.4 x 0.2 x 0.12
DSN0603-2 (SOD962) 0.6. x 0.3 x 0.3
DSN1006-2 (SOD993) 1.0 x 0.6 x 0.3
DSN1006U-2 (SOD995) 1.0 x 0.6 x 0.3
DFN1006D-2 (SOD882D) 1.0 x 0.6 x 0.37
DFN1006-2 (SOD882) 1.0 x 0.6 x 0.48
SOD523 1.2 x 0.8 x 0.6
DFN1608D-2 (SOD1608) 1.6 x 0.8 x 0.37
SOD323F 1.7 x 1.25 x 0.7
SOD323 1.7 x 1.25 x 0.95
SOD123F 2.6 x 1.6 x 1.1
SOD123W 2.6 x 1.7 x 1.0
SOD128 3.8 x 2.6 x 1.0
CFP15 (SOT1289) 5.8 x 4.3 x 0.78
D2PAK (SOT404) 11.0 x 10.0 x 4.3

3 Pins

DFN1006B-3 (SOT883B) 1.0 x 0.6 x 0.37
DFN1006-3 (SOT883) 1.0 x 0.6 x 0.48
DFN1010D-3 (SOT1215) 1.1 x 1.0 x 0.37
SOT663 1.6 x 1.2 x 0.55
SOT323 2.0 x 1.25 x 0.95
SOT23 2.9 x 1.3 x 1.0
DFN2020-3 (SOT1061) 2.0 x 2.0 x 0.62
DFN2020D-3 (SOT1061D) 2.0 x 2.0 x 0.62
SOT89 4.5 x 2.5 x 1.5
DPAK (SOT428) 6.6 x 6.1 x 2.3

4/5 Pins

WLCSP4* 0.8 x 0.8 x 0.35
WLCSP5* 1.51 x 1.14 x 0.65
SOT665 1.6 x 1.2 x 0.55
SOT353 2.0 x 1.25 x 0.95
SOT143B 2.9 x 1.3 x 1.0
LFPAK33 (SOT1210) 3.3 x 3.3 x 0.85
LFPAK56 (SOT669) 4.9 x 4.45 x 1.0
SOT223 6.5 x 3.5 x 1.65

6 Pins

DFN1010E-6 (SOT1202) 1.0 x 1.0 x 0.35
DFN1010B-6 (SOT1216) 1.0 x 1.0 x 0.37
DFN1010-6 (SOT891) 1.0 x 1.0 x 0.48
DFN1410-6 (SOT886) 1.45 x 1.0 x 0.48
SOT666 1.6 x 1.2 x 0.55
SOT363 2.0 x 1.25 x 0.95
DFN2020-6 (SOT1118) 2.0 x 2.0 x 0.62
DFN2020D-6 (SOT1118D) 2.0 x 2.0 x 0.62
DFN2020MD-6 (SOT1220) 2.0 x 2.0 x 0.62
SOT457 2.9 x 1.5 x 1.0
LFPAK56D (SOT1205) 4.9 x 4.45 x 1.0

≥ 7 Pins

DFN2110-9 (SOT1178) 2.1 x 1.0 x 0.48
DFN2111-7 (SOT1358) 2.1 x 1.1 x 0.5
DFN2510A-10 (SOT1176) 2.5 x 1.0 x 0.48
DFN2520-9 (SOT1333) 2.5 x 2.0 x 0.48
DFN2521-12 (SOT1156-1) 2.5 x 2.1 x 0.5
DFN3525-16 (SOT763) 3.5 X 2.5 X 0.5
DFN4020-14 (SOT1334) 4.0 x 2.0 x 0.48
DFN4040-32 (SOT1318-1) 4.0 x 4.0 x 0.5
DFN5050-32 (SOT617-3) 5.0 x 5.0 x 0.85

* The exact position of the balls and package dimensions vary.

The partner for excellence, experience, and innovation

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Our commitment: quality and reliability

AEC-Q101

- Our product-qualification strategies begin with a baseline of AEC-Q101, and then exceed this standard.
- NXP has more than 15 years of experience qualifying small-signal discretes for automotive, and we've generated an impressive track record of reliability.

goforQuality
customer focused passion to win

- All our processes and manufacturing plants are subject to regular international and internal audits, including the following:
  - ISO9001
  - ISO/TS 16949 for automotive sites
  - ISO14001
  - OHSAS18001

DfX EXCELLENCE

- NXP's Design for Excellence (DfX) program ensures that each new development builds on past learning and that best practices are always employed. The result is continual product improvement.

ZERO DEFECT

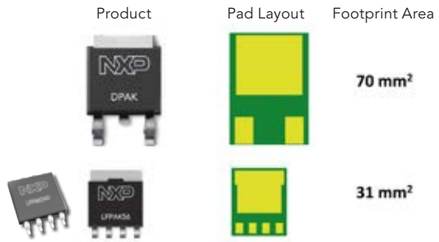
- Our "Zero Defects" culture is supported by a dedicated team of technical experts, specializing in product quality, failure analysis, and process engineering, and working at all stages of development and production. Failure analysis is supported by a determination to find root causes and to eliminate failure modes through widespread adoption of quality-analysis tools and methodologies (e.g. Six-Sigma, Safe-Launch).

Rigorous attention to detail and commitment to quality have yielded a very low product failure rate of a single-digit part per billion (ppb).

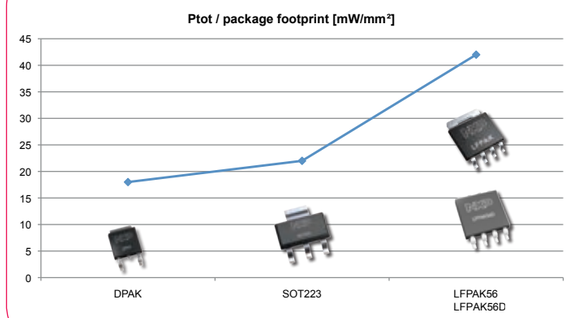
Bipolar transistors

Bipolar transistors in LFPAK56 and LFPAK56D
Miniaturization of power

Same power dissipation but half the size



55 % package size reduction while retaining the same power performance

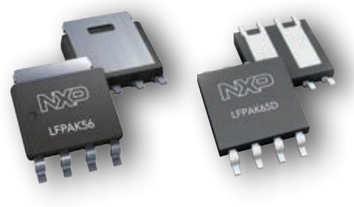


Reduced PCB area requirements compared to SOT223 and DPAK

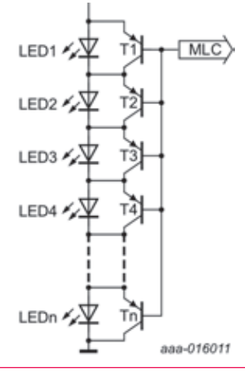
In the spotlight

Bipolar transistors in LFPAK56 and LFPAK56D power packages

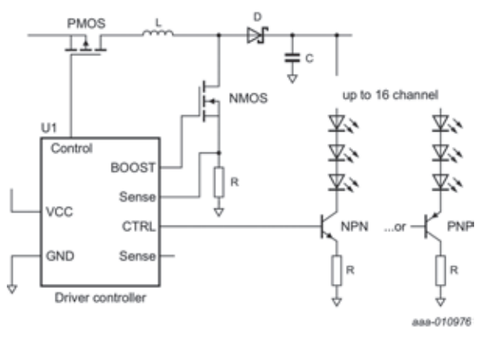
- High thermal power dissipation up to 3 W
- Vceo up to 100 V
- All types in LFPAK56D and 18 types in LFPAK56 AECQ 101 qualified (IC = 3 up to 15 A)
- 2 types in LFPAK56D with current gain matching of 5 and 10 %
- Reduced PCB area requirements compared to transistors in DPAK
- Suitable for high-temperature applications up to 175 °C
- Designed for reliability, solid copper clip, wire-free
- High energy efficiency due to less heat generation
- Ultra-thin packages of only 1 mm height



Dimming transistor in matrix headlamp



Backlight unit (PHPT61002NYC/PYC)



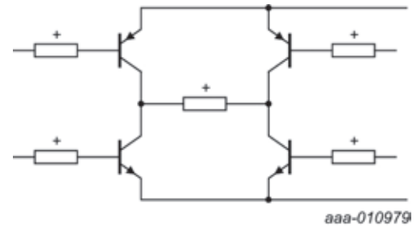
LFPAK56 (SOT669)
Single package
4.8 x 6 x 1.1

Applications

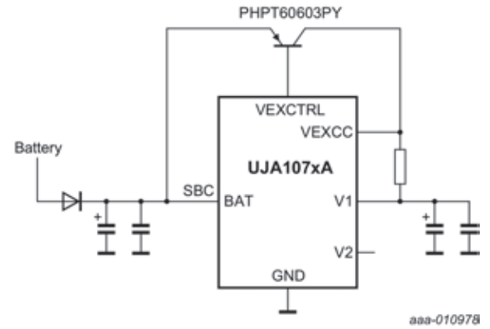
- Power management
- Loadswitch
- Linear-mode voltage regulator
- Backlight units
- Motor drive
- LED lighting
- Relay replacement
- IGBTdrive

LFPAK56D (SOT1205)
Dual package
4.8 x 6 x 1.1

Motor drive (2x PHPT60603NY/PY) or a double LFPAK56D (PHPT610030NK/PK)



IVN – System Basis Chip (PHPT60603PY)
External pass transistor, linear regulator



Nomenclature for high-power transistors

P HPT 6 10 03 0 N Y

- **NXP bipolar transistor**
- **H**igh **P**ower **T**ransistor
- **Product identifier**
- **Max Vceo x 10**
  e.g.: **10** = 100 V
- **Max Ic current**
  e.g.: **03** = 3 A
- **Matching info (only for LFPAK56D)**
  0 = No matching
  5 = Hfe maching
- **Polarity**
  N = NPN
  P = PNP
  NP = NPN / PNP
- **Package Code**
  Y = LFPAK56 (SOT669)
  K = LFPAK56d (SOT1205)

High-power transistors (single)

Package											LFPAK56 (SOT669)
Size (mm)											4.8 x 6 x 1.1
V_{CEO} (V)	I_C (A)	I_{CM} (A)	h_{FE} typ	@ I_C (A)	@ V_{CE} (V)	R_{CEsat} typ. @ I_C/I_B=10	V_{CEsat} typ (mV); I_C = 0.5 A; I_B = 0.05 A	V_{CEsat} max (mV)	@ I_C (A)	@ I_B (A)	Polarity	
60	3	8	200 / 400	0.5	2	60	50	270	3	0.3	NPN	PHPT60603NY
			200 / 400	0.5	2	80	70	360	3	0.3	PNP	PHPT60603PY
100	3		150 / 250	0.5	10	75	50	330	3	0.3	NPN	PHPT61003NY
			150 / 220	0.5	10	110	70	360	2	0.2	PNP	PHPT61003PY
	2	6	150 / 250	0.5	10	80	50	300	2	0.2	NPN	PHPT61002NYC
			150 / 220	0.5	10	125	70	400	2	0.2	PNP	PHPT61002PYC

High-current, high-power transistors

Package						LFPAK56 (SOT669)
Size (mm)						4.8 x 6 x 1.1
V_{CEO} (V)	I_C (A)	h_{FE} typ	@ I_C (A)	@ V_{CE} (V)	Polarity	
40	6	200/400	0.5	2	NPN	PHPT60406NY
40	6	200/400	0.5	2	PNP	PHPT60406PY
40	10	200/400	0.5	2	NPN	PHPT60410NY
40	10	200/400	0.5	2	PNP	PHPT60410PY
40	15	200/400	0.5	2	NPN	PHPT60415NY
40	15	200/400	0.5	2	PNP	PHPT60415PY
60	6	200/400	0.5	2	NPN	PHPT60606NY
60	6	150/250	0.5	2	PNP	PHPT60606PY
60	10	200/400	0.5	2	NPN	PHPT60610NY
60	10	150/250	0.5	2	PNP	PHPT60610PY
100	6	150/250	0.5	10	NPN	PHPT61006NY
100	6	150/220	0.5	10	PNP	PHPT61006PY
100	10	150/250	0.5	10	NPN	PHPT61010NY
100	10	150/220	0.5	10	PNP	PHPT61010PY

High-power transistors (double)

Package												LFPAK56D (SOT1205)
Size (mm)												4.8 x 6 x 1.1
V_{CEO} (V)	I_C (A)	I_{CM} (A)	h_{FE} typ	@ I_C (A)	@ V_{CE} (V)	R_{CEsat} typ. @ I_C/I_B=10	V_{CEsat} typ (mV); I_C = 0.5 A; I_B = 0.05 A	V_{CEsat} max (mV)	@ I_C (A)	@ I_B (A)	Polarity	h_{FE1}/ h_{FE2}	
100	3	6	150	0.5	10	80	50	300	3	0.2	2XNPN	-	PHPT610030NK
						125	70	400	3	0.2	2XPNP	-	PHPT610030PK
						80 / 125	50 / 70	300 / 400	3	0.2	NPN/PNP	-	PHPT61003NPK
						80	50	300	3	0.2	2XNPN	0.95	PHPT610035NK
						125	70	400	3	0.2	2XPNP	0.9	PHPT610035PK

Low V_{CEsat} (BISS) transistors single NPN

In the spotlight

New low V_{CEsat} transistors up to 2 A in DFN1010D-3: 2 A on 1.1 mm² footprint

- High I_C performance on ultra-small footprint
- V_{CE} 30 and 60 V
- Leadless DFN1010D-3 (SOT1215) SMD package with solderable sidepads (1.1 x 1.0 x 0.37)
- AEC-Q101 qualified

types in **bold** represent new products

Package											SOT23	SOT323 (SC-70)	SOT363 (SC-88)	DFN1006-3 (SOT883)	DFN1006B-3 (SOT883B)	DFN1010D-3 (SOT1215)
Size (mm)											2.9 x 1.3 x 1.0	2.0 x 1.25 x 0.95	2.0 x 1.25 x 0.95	1.0 x 0.6 x 0.48	1.0 x 0.6 x 0.37	1.1 x 1.0 x 0.37
P_{tot} (mW)											480	350	430	250	250	750
V_{CEO} (V)	I_C (A)	I_{CM} (A)	h_{FE} min/typ	@ I_C (A)	@ V_{CE} (V)	R_{CEsat} typ (mΩ); I_C/I_B = 10	V_{CEsat} typ (mV); I_C = 0.5 A; I_B = 0.05 A	V_{CEsat} max (mV)	@ I_C (A)	@ I_B (A)						
15	0.5	1	200 / 325	0.01	2	360	-	250	0.5	0.05				PBSS2515M	PBSS2515MB	
			200 / 425	0.01	2	300	200	250	0.5	0.05						
20	1	3	350 / 470	0.1	2	220	110 [2]	250	1	0.05	PBSS4120T					
	2	5	220 / 330	0.1	2	80	45	310	3	0.3	PBSS4320T					
	4.3	8	300 / 550	0.5	2	36	21	220	4	0.2	PBSS4021NT					
30	1	1.5	230 / 380	0.5	2	175	90	235	1	0.1						PBSS4130QA
		3	300 / 450	0.5	2	240	120 [2]	270	1	0.05	PBSS4130T					
	2	3	300 / 450	0.5	2	120	70	320	2	0.2	PBSS4230T					
			230 / 380	0.5	2	135	75	350	2	0.2						PBSS4230QA
	2.6	5	300 / 500	0.5	2	76	80	320	3	0.3	PBSS4032NT [3]					
40	0.5	1	200 / 550	0.01	2	380	200 [2]	250	0.5	0.05				PBSS2540M	PBSS2540MB	
			200 / 350	0.01	2	380	190	250	0.5	0.05						
	2.0		300 / 440	0.5	5	240	130	500	1	0.1		PBSS4140U				
			300 / 510	0.5	5	230	120	500	1	0.1	PMMT491A					
			300 / 420	0.5	5	150	130	500	1	0.1	PBSS4140T					
	3.0		300 / -	0.5	5	280	140	510	2	0.2						
			350 / 470	0.1	2	120	70	320	2	0.2			PBSS4240Y			
			300 / 450	0.5	2	120	70	320	2	0.2	PBSS4240T					
50	2	5	300 / 495	0.5	2	100	60	260	2	0.2	PBSS4350T					
60	1.0	1.5	150 / 240	0.5	2	170	90	235	1	0.1						PBSS4160QA
			200 / 420	0.5	5	230	120	280	1	0.1		PBSS4160U				
			200 / 350	0.5	5	200	110	250	1	0.1	PBSS4160T					
	2	3	150 / 240	0.5	2	125	75	350	2	0.2						PBSS4260QA
	3.8	8	300 / 500	0.5	2	46	29	200	3	0.3	PBSS4041NT					
100	1.0	3.0	150 / 400	0.25	10	160	80	200	1	0.1			PBSS8110Y			
			150 / 300	0.25	10	165	70	200	1	0.1	PBSS8110T					

[1] I_C / I_B = 20 [2] V_{CEsat} (max) [3] Optimized for high-speed switching

Low V_{CEsat} (BISS) transistors single PNP

In the spotlight

Low V_{CEsat} transistors up to 2 A in DFN1010D-3: 2 A on 1.1 mm² footprint

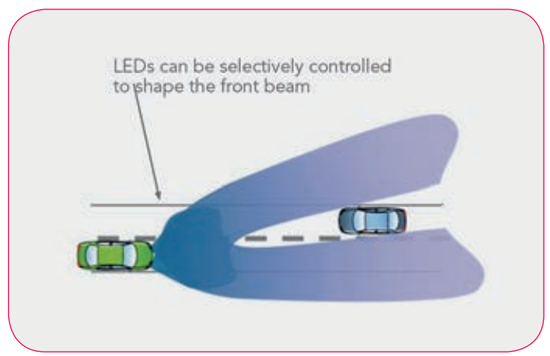
- High I_C performance on ultra-small footprint
- V_{CE} 30 and 60 V
- Leadless DFN1010D-3 (SOT1215) SMD package with solderable sidepads (1.1 x 1.0 x 0.37)
- AEC-Q101 qualified

Package											SOT23	SOT323 (SC-70)	SOT363 (SC-88)	DFN1006-3 (SOT883)	DFN1006B-3 (SOT883B)	DFN1010D-3 (SOT1215)
Size (mm)											2.9 x 1.3 x 1.0	2.0 x 1.25 x 0.95	2.0 x 1.25 x 0.95	1.0 x 0.6 x 0.48	1.0 x 0.6 x 0.37	1.1 x 1.0 x 0.37
P_{tot} (mW)											480	350	430	250	250	750
V_{CEO} (V)	I_C (A)	I_{CM} (A)	h_{FE} min/typ	@ I_C (A)	@ V_{CE} (V)	R_{CEsat} typ (mΩ); I_C/I_B = 10	V_{CEsat} typ (mV); I_C = 0.5 A; I_B = 0.05 A	V_{CEsat} max (mV)	@ I_C (A)	@ I_B (A)						
15	0.5	1	200 / 260	0.01	2	300	150	250	0.5	0.05				PBSS3515M	PBSS3515MB	
			200 / 325	0.01	2	300	150	250	0.5	0.05						
20	1	2	300 / 450	0.1	2	250	125 2)	250	1	0.05	PBSS5120T					
	2.0	3	225 / -	0.5	2	115	80 2)	225	2	0.2	PBSS5220T					
		5	220 / 420	0.5	2	75	50	210	3	0.2	PBSS5320T					
	3.5	8	250 / 400	0.5	2	55	35	375	4	0.2	PBSS4021PT					
30	1	1.5	180 / 295	0.5	2	160	85	240	1	0.1						PBSS5130QA
		3	260 / 350	0.5	2	220	110	225	1	0.05	PBSS5130T					
	2		300 / 450	0.1	2	160	70	350	2	0.2	PBSS5230T					
			180 / 295	0.5	2	125	70	330	2	0.2						PBSS5230QA
	2.4	5	200 / 320	0.5	2	110	95	330	2	0.2	PBSS4032PT 3)					
40	0.5	1	200 / 380	0.01	2	440	220	350	0.5	0.05				PBSS3540M	PBSS3540MB	
			200 / 380	0.01	2	440	230	350	0.5	0.05						
	1.0	2.0	300 / 520	0.1	5	230	130	500	1	0.1		PBSS5140U				
			300 / 800	0.1	5	250	130	500	1	0.1	PMMT591A					
			300 / 510	0.1	5	230	130	500	1	0.1	PBSS5140T					
			300 / -	0.1	2	200	110 2)	350	2	0.2			PBSS5240Y			
			300 / 450	0.1	2	150	70	350	2	0.2	PBSS5240T					
50	2.0	3	200 / -	0.5	2	150	90 2)	300	2	0.1	PBSS5250T					
	2.0	5	200 / 360	0.5	2	90	55	270	2	0.2	PBSS5350T					
60	1.0	1.5	120 / 185	0.5	2	225	125	330	1	0.1						PBSS5160QA
			150 / 250	0.5	5	255	135	340	1	0.1		PBSS5160U				
			150 / 250	0.5	5	220	120	330	1	0.1	PBSS5160T					
	1.7	2.5	120 / 185	0.5	2	205	105	500	1-juil	0.17						PBSS5260QA
	2.7	8	200 / 300	0.5	2	80	49	360	3	0.3	PBSS4041PT					
100	1.0	3.0	150 / -	0.25	5	170	93	320	1	0.1			PBSS9110Y			
			150 / 350	0.5	5	170	95	320	1	0.1	PBSS9110T					

[1] I_C / I_B = 20 [2] V_{CEsat} (max) [3] Optimized for high-speed switching

DFN2020D-6 with solderable sidepads
Innovation for LED lighting in automotive

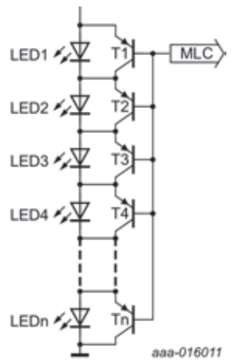
Matrix light sketch



PBSS5160PAPS in DFN2020D-6

- Industry first low VCESat transistor in DFN2020 with 100 % solderable sidepads
- Enables individual dimming in the LED front light matrix solution
- Offers automatic optical inspection of solder joints
- Saves PCB space by replacing two DFN2020D-3 or two SOT89 packages

Dimming transistor application



Key package benefits

- AEC-Q101 qualified
- Suitable for AOI of solder joints
- Leadless SMD plastic package with solderable side pads
- Exposed heat sink for excellent thermal and electrical conductivity
- Package size of only 2 x 2 mm and a height of only 0.62 mm
- Single version available in DFN2020D-3

Low V_{CEsat} double transistors portfolio on DFN2020D-6

V_{CEO} (V)	I_C (A)	Polarity	h_{FE} min	@ I_C (A)	@ V_{CE} (V)	V_{CEsat} typ (mV); I_C = 0.5 A; I_B = 0.05 A	V_{CEsat} max (mV)	@ I_C (A)	@ I_B (A)	Product
60	1	NPN / NPN	150	0.5	2	90	120	0.5	0.05	PBSS4160PANS
		PNP / PNP	120	0.5	2	125	180	0.5	0.05	PBSS5160PAPS
		NPN / PNP	150 /120	0.5	2	90 / 125	120 / 180	0.5	0.05	PBSS4160PANPS

Low V_{CEsat} (BISS) double transistors

In the spotlight

Low V_{CEsat} (BISS) transistors

- Industry's first combination of reduced switching times (down to 125 ns) with minimized saturation voltage (below 50 mV)
- Voltage range from 12 to 120 V
- Flexible package options, from standard SMD to brand-new, ultra-small leadless package DFN1010B-3 (SOT883B) (1.0 x 0.6 x 0.37 mm)
- Provides benchmark reduced on-state resistance
- New double BISS transistors in LFPAK56D (SOT1205), DFN2020-6 (SOT1118), and DFN2020D-6 (SOT1118D) with solderable sidepads
- New 2 A BISS transistors in SOT89 and SOT223 available: PBSS4240X, PBSS5240X, PBSS4240Z, and PBSS5240Z

types in **bold** represent new products

Package									SOT96 (SO8)	SOT457 (SC-74)	SOT666	DFN2020-6 (SOT1118)	DFN2020D-6 (SOT1118D)
Size (mm)									4.9 x 3.9 x 1.75	2.9 x 1.5 x 1.0	1.6 x 1.2 x 0.55	2.0 x 2.0 x 0.62	2.0 x 2.0 x 0.62
P_{tot} (mW)									2000 [2]	750	500	1300	1300
V_{CEO} (V)	I_C (A)	Polarity	h_{FE} min	@ I_C (A)	@ V_{CE} (V)	V_{CEsat} typ (mV); I_C = 0.5 A; I_B = 0.05 A	V_{CEsat} max (mV)	@ I_C (A)	@ I_B (A)					
15	0.5	2 x NPN	200	0.01	2	170 [1]	250	0.5	0.05			PBSS2515VS		
		2 x PNP	200	0.01	2	170 [1]	250	0.5	0.05			PBSS3515VS		
		NPN / PNP	200	0.01	2	170 [1]	250	0.5	0.05			PBSS2515VPN		
20	7.5	NPN / NPN	300	0.5	2	15	150	4	0.2	PBSS4021SN				
	6.3	PNP / PNP	250	0.5	2	24	225	4	0.2	PBSS4021SP				
	7.5 / 6.3	NPN / PNP	300 / 250	0.5	2	15 / 24	150 / 225	4	0.2	PBSS4021SPN				
30	1	NPN / NPN	210	0.5	2	75	100	0.5	0.05				PBSS4130PAN	
		PNP / PNP	170	0.5	2	85	140	0.5	0.05				PBSS5130PAP	
		NPN / PNP	210 / 170	0.5	2	75 / 85	100 / 140	0.5	0.05				PBSS4130PANP	
	2	NPN / NPN	230	0.5	2	60	80	0.5	0.05				PBSS4230PAN	
		PNP / PNP	210	0.5	2	75	110	0.5	0.05				PBSS5230PAP	
		NPN / PNP	230 / 210	0.5	2	60 / 75	80 / 100	0.5	0.05				PBSS4230PANP	
	5.7	NPN / NPN	300	0.5	2	57	250	4	0.4	PBSS4032SN [3]				
	4.8	PNP / PNP	200	0.5	2	70	390	4	0.4	PBSS4032SP [3]				
	5.7 / 4.8	NPN / PNP	300 / 200	0.5	2	57 / 70	250 / 390	4	0.4	PBSS4032SPN [3]				
40	1.0	NPN / PNP	300 / 250	0.5	5	130 / 150	500	1	0.1		PBSS4140DPN			
	2.0	NPN / PNP	300 / 250	0.5	5	80 / 100	400 / 530	2	0.2		PBSS4240DPN			
50	2.7	2 x NPN	300	0.5	2	50	340	2.7	0.27	PBSS4350SS				
		2 x PNP	200	0.5	2	60	370	2.7	0.27	PBSS5350SS				
		NPN / PNP	300 / 200	0.5	2	50 / 60	340 / 370	2.7	0.27	PBSS4350SPN				
60	1.0	2 x NPN	200	0.5	5	115	250	1	0.1		PBSS4160DS			
		2 x PNP	150	0.5	5	120	330	1	0.1		PBSS5160DS			
		NPN / PNP	200 / 150	0.5	5	115 / 120	250 / 330	1	0.1		PBSS4160DPN			
	1	NPN / NPN	150	0.5	2	90	120	0.5	0.05				PBSS4160PAN	**PBSS4160PANS**
		PNP / PNP	120	0.5	2	125	180	0.5	0.05				PBSS5160PAP	**PBSS5160PAPS**
		NPN / PNP	150 / 120	0.5	2	90 / 125	120 / 180	0.5	0.05				PBSS4160PANP	**PBSS4160PANPS**
	2	NPN / NPN	210	0.5	2	70	90	0.5	0.05				PBSS4260PAN	
		PNP / PNP	140	0.5	2	100	140	0.5	0.05				PBSS5260PAP	
		NPN / PNP	210 / 140	0.5	2	70 / 100	90 / 140	0.5	0.05				PBSS4260PANP	
	6.7	NPN / NPN	300	0.5	2	20	190	4	0.2	PBSS4041SN				
	5.9	PNP / PNP	200	0.5	2	35	330	4	0.2	PBSS4041SP				
	6.7 / 5.9	NPN / PNP	300 / 200	0.5	2	20 / 35	190 / 330	4	0.2	PBSS4041SPN				
120	1	NPN / NPN	240	0.1	2	90	120	0.5	0.05				PBSS4112PAN	
		PNP / PNP	190	0.1	2	150	220	0.5	0.05				PBSS5112PAP	
		NPN / PNP	240 / 190	0.1	2	90 / 150	120 / 220	0.5	0.05				PBSS4112PANP	

[1] I_c / I_b=20 [2] Device mounted on a ceramic PCB, Al2O3, standard footprint [3] Optimized for high-speed switching

Medium-power low V_{CEsat} (BISS) transistors single NPN

types in **bold** represent new products

Package										SOT223 (SC-73)	SOT89 (SC-62)	SOT457 (SC-74)	DFN2020-3 (SOT1061)	DFN2020D-3 (SOT1061D)
Size (mm)										6.5 x 3.5 x 1.65	4.5 x 2.5 x 1.5	2.9 x 1.5 x 1.0	2.0 x 2.0 x 0.62	2.0 x 2.0 x 0.62
P_{tot} (mW)										1700	1650	750	1300	1300
V_{CEO} (V)	I_C (A)	I_{CM} (A)	h_{FE} min/typ	@ I_C (A)	@ V_{CE} (V)	R_{CEsat} typ (mΩ); I_C/I_B = 10	V_{CEsat} typ (mV); I_C = 0.5 A; I_B = 0.05 A	V_{CEsat} max (mV)	@ I_C (A)	@ I_B (A)					
12	5.3	10.6	300 / 530	0.5	2	27 [1]	18	200	5.3	0.265		PBSS301NX			
	5.8	11.6	300 / 530	0.5	2	29 [1]	18	235	5.8	0.29	PBSS301NZ				
	6	7	280 / 440	0.5	2	33 [1]	20	275	6	0.3				PBSS4612PA	**PBSS4612PAS**
20	3	5	220 / 390	0.5	2	85	40	310	3	0.3		PBSS4320X			
	4	15	300 / 450	0.5	2	50	30	280	4	0.4			PBSS301ND		
	5	10	300 / 450	0.5	2	32	35	220	5	0.5		PBSS4520X			
	5.3	10.6	300 / 570	0.5	2	27 [1]	20	200	5.3	0.265		PBSS302NX			
	5.8	10.2	300 / 570	0.5	2	30 [1]	20	250	5.8	0.29	PBSS302NZ				
	6	7	280 / 440	0.5	2	33 [1]	20	275	6	0.3				PBSS4620PA	**PBSS4620PAS**
	7	15	300 / 550	0.5	2	19	12	210	7	0.35		PBSS4021NX			
	8	20	300 / 550	0.5	2	14	9	170	8	0.4	PBSS4021NZ				
30	3	5	300 / 490	0.5	2	80	45	300	3	0.3		PBSS4330X			
	3	5	300 / 465	0.5	2	75	40	300	3	0.3				PBSS4330PA	**PBSS4330PAS**
	3.5	6	300 / 500	0.5	2	50	70	300	4	0.4			PBSS4032ND [3]		
	4.7	10	300 / 500	0.5	2	45	57	250	4	0.4		PBSS4032NX [3]			
	5.1	10.2	300 / 480	0.5	2	30 [1]	20	220	5.1	0.255		PBSS303NX			
	5.4	10	300 / 500	0.5	2	45	57	340	4.9	0.27	PBSS4032NZ [3]				
	5.5	11	300 / 480	0.5	2	31 [1]	20	240	5.5	0.275	PBSS303NZ				
	6	7	280 / 450	0.5	2	35 [1]	21	275	6	0.3				PBSS4630PA	**PBSS4630PAS**
40	2.0	3.0	300 / -	0.5	5	280	140	510	2	0.2		PBSS4240X			
	4	15	300 / 520	0.5	2	55	35	300	4	0.4			PBSS302ND		
		10	300 / 500	0.5	2	40	21	355	5	0.5		PBSS4540X			
	5	10	300 / 500	0.5	2	42	25	355	5	0.5	PBSS4540Z				
50	2	5	300 / -	0.5	2	160	90 [2]	320	2	0.2		PBSS4250X			
	3.0	5.0	200 / 280	0.5	2	110	65	290	2	0.2			PBSS4350D		
			300 / 460	0.5	2	75	50	370	3	0.3		PBSS4350X			
			200 / 280	0.5	2	110	60 [1]	290	2	0.2	PBSS4350Z				
60	3	6	345 / 570	0.5	2	65	40	260	3	0.3			PBSS303ND		
	4.7	9.4	300 / 520	0.5	2	37 [1]	25	245	4.7	0.235		PBSS304NX			
	5.2	10.4	300 / 520	0.5	2	39 [1]	25	280	5.2	0.26	PBSS304NZ				
	6	7	280 / 440	0.5	2	34 [1]	22	290	6	0.3				PBSS4560PA	**PBSS4560PAS**
	6.2	15	300 / 500	0.5	2	25	17	230	6	0.3		PBSS4041NX			
	7	15	300 / 500	0.5	2	17.5	13	195	7	0.35	PBSS4041NZ				
80	3	6	240 / 360	0.5	2	67	40	255	3	0.3			PBSS304ND		
	4	10	250 / 400	0.5	2	43 [1]	25	230	4	0.2		PBSS4480X			
	4.6	9.2	300 / 470	0.5	2	37 [1]	25	240	4.6	0.23		PBSS305NX			
	5.1	10.2	300 / 470	0.5	2	38 [1]	25	270	5.1	0.255	PBSS305NZ				
	5.6	7	270 / 425	0.5	2	40 [1]	25	320	5.6	0.28				PBSS4580PA	**PBSS4580PAS**
100			150 / 290	0.25	10	160	75	200	1	0.1			PBSS8110D		
			150 / 290	0.25	10	165	73	200	1	0.1		PBSS8110X			
			150 / 290	0.25	10	160	73	200	1	0.1	PBSS8110Z				
	3	4	170 / 275	0.5	2	72	45	360	4	0.4			PBSS305ND		
	4.5	9	200 / 330	0.5	2	38 [1]	27	245	4.5	0.225		PBSS306NX			
	5.1	10.2	200 / 330	0.5	2	43 [1]	27	300	5.1	0.255	PBSS306NZ				
	5.2	6	180 / 285	0.5	2	48 [1]	30	340	5.2	0.26				PBSS8510PA	**PBSS8510PAS**

[1] I_C / I_B = 20 [2] V_{CEsat} (max) [3] Optimized for high-speed switching

Medium-power low V_{CEsat} (BISS) transistors single PNP

types in **bold** represent new products

Package											SOT223 (SC-73)	SOT89 (SC-62)	SOT457 (SC-74)	DFN2020-3 (SOT1061)	DFN2020D-3 (SOT1061D)
Size (mm)											6.5 x 3.5 x 1.65	4.5 x 2.5 x 1.5	2.9 x 1.5 x 1.0	2.0 x 2.0 x 0.62	2.0 x 2.0 x 0.62
P_{tot} (mW)											1700	1650	750	1300	1300
V_{CEO} (V)	I_C (A)	I_{CM} (A)	h_{FE} min/typ	@ I_C (A)	@ V_{CE} (V)	R_{CEsat} typ (mΩ); I_C/I_B = 10	V_{CEsat} typ (mV); I_C = 0.5 A; I_B = 0.05 A	V_{CEsat} max (mV)	@ I_C (A)	@ I_B (A)					
12	5.3	10.6	250 / 400	0.5	2	28 [1]	20	210	5.3	0.265		PBSS301PX			
	5.7	11.4	250 / 400	0.5	2	30 [1]	20	245	5.7	0.285	PBSS301PZ				
	6	7	220 / 335	0.5	2	33 [1]	20	300	6	0.3				PBSS5612PA	**PBSS5612PAS**
20	3	5	200 / -	0.5	2	85	80 [2]	400	3	0.3			PBSS5320D		
			220 / 450	0.5	2	90	50	300	3	0.3		PBSS5320X			
	3.5	8	250 / 400	0.5	2	55	35	375	4	0.2					
	4	15	250 / 400	0.5	2	50	35	280	4	0.4			PBSS301PD		
	5	10	300 / 430	0.5	2	34	45	270	5	0.5		PBSS5520X			
	5.1	10.2	250 / 370	0.5	2	32 [1]	25	230	5.1	0.255		PBSS302PX			
	5.5	11	250 / 370	0.5	2	34 [1]	25	265	5.5	0.275	PBSS302PZ				
	6	7	230 / 345	0.5	2	39 [1]	25	350	6	0.3				PBSS5620PA	**PBSS5620PAS**
	6.2	15	250 / 400	0.5	2	23	18	240	6	0.3		PBSS4021PX			
	6.6	20	250 / 400	0.5	2	22	16	240	7	0.35	PBSS4021PZ				
30	2.7	5	200 / 350	0.5	2	88	87	395	3	0.3			PBSS4032PD [3]		
	3	5	200 / 380	0.5	2	80	50	320	3	0.3		PBSS5330X			
			200 / 320	0.5	2	75	45	320	3	0.3				PBSS5330PA	**PBSS5330PAS**
	4.2	10	200 / 350	0.5	2	58	70	345	4	0.4		PBSS4032PX [3]			
	4.4	10	200 / 350	0.5	2	58	70	400	4	0.2	PBSS4032PZ [3]				
	5.1	10.2	250 / 400	0.5	2	32 [1]	25	230	5.1	0.255		PBSS303PX			
	5.3	10.6	250 / 400	0.5	2	35 [1]	25	265	5.3	0.265	PBSS303PZ				
	6	7	200 / 335	0.5	2	39 [1]	25	350	6	0.3				PBSS5630PA	**PBSS5630PAS**
40	2.0	3.0	215 / -	0.5	5	340	170	500	2	0.2		PBSS5240X			
	4	15	200 / 310	0.5	2	55	46	300	4	0.4			PBSS302PD		
		10	250 / 370	0.5	2	45	33	375	5	0.5		PBSS5540X			
	5		250 / 350	0.5	2	55	40 [1]	160	2	0.2	PBSS5540Z				
50	2.0	5	200 / -	0.5	2	160	90 [2]	320	2	0.2		PBSS5250X			
	3.0	5.0	200 / 300	0.5	2	120	70	300	2	0.2			PBSS5350D		
			200 / 375	0.5	2	120	70	390	3	0.3		PBSS5350X			
			200 / 300	0.5	2	120	70	300	2	0.2	PBSS5350Z				
60	3	6	180 / 265	0.5	2	70	55	290	3	0.3			PBSS303PD		
	4.2	8.4	200 / 295	0.5	2	53 [1]	35	310	4.2	0.21		PBSS304PX			
	4.5	9	200 / 295	0.5	2	59 [1]	35	375	4.5	0.225	PBSS304PZ				
	5	6	170 / 260	0.5	2	35 [1]	35	450	5	0.25				PBSS5560PA	**PBSS5560PAS**
	5	15	200 / 300	0.5	2	40	30	300	5	0.5		PBSS4041PX			
	5.7		200 / 300	0.5	2	29	22	285	6	0.3	PBSS4041PZ				
80	3	5	155 / 225	0.5	2	71	55	290	3	0.3			PBSS304PD		
	4.0		180 / 265	0.5	2	65 [1]	40	420	4	0.2				PBSS5580PA	**PBSS5580PAS**
		10	200 / 300	0.5	2	50	35	380	5	0.5		PBSS5480X			
		8	200 / 280	0.5	2	43	36	240	4	0.4		PBSS305PX			
	4.5	9	200 / 280	0.5	2	69 [1]	36	450	4.5	0.225	PBSS305PZ				
100	1.0	3.0	150 / 350	0.5	5	170	100	320	1	0.1			PBSS9110D		
			150 / 350	0.5	5	170	90	320	1	0.1		PBSS9110X			
			150 / -	0.5	5	170	90	320	1	0.1	PBSS9110Z				
	2	3	175 / 275	0.5	2	88	65	250	2	0.2			PBSS305PD		
	2.7	4	180 / 295	0.5	2	110 [1]	45	450	2.7	0.135				PBSS9410PA	**PBSS9410PAS**
	3.7	7.4	200 / 300	0.5	2	52	45	300	4	0.4		PBSS306PX			
	4.1	8.2	200 / 300	0.5	5	57	45	325	4.1	0.41	PBSS306PZ				

[1] I_C / I_B = 20 [2] V_{CEsat} (max) [3] Optimized for high-speed switching

Low V_{CEsat} (BISS) load switches

Package				SOT457 (SC-74)		SOT363 (SC-88)
Size (mm)				2.9 x 1.5 x 1.0		2.0 x 1.25 x 0.95
P_{tot} (mW)				750 [1]	600 [1]	300 [2]
V_{CEO} (V)	I_C (A)	V_{CEsat} max (mV); I_C = 0.5 A; I_B = 0.05 A	R1, R2 (kΩ)			
15	0.5	250	2.2			PBLS1501Y
			4.7			PBLS1502Y
			10			PBLS1503Y
			22			PBLS1504Y
20	1	150	2.2		PBLS2001D	
			4.7		PBLS2002D	
			10		PBLS2003D	
			22		PBLS2004D	
	1.8	70	2.2	PBLS2021D		
			4.7	PBLS2022D		
			10	PBLS2023D		
			22	PBLS2024D		
40	0.5	350	2.2			PBLS4001Y
			4.7			PBLS4002Y
			10			PBLS4003Y
			22			PBLS4004Y
			47			PBLS4005Y
	1	170	2.2		PBLS4001D	
			4.7		PBLS4002D	
			10		PBLS4003D	
			22		PBLS4004D	
			47		PBLS4005D	
60	1	180	2.2		PBLS6001D	
			4.7		PBLS6002D	
			10		PBLS6003D	
			22		PBLS6004D	
			47		PBLS6005D	
	1.5	100	2.2	PBLS6021D		
			4.7	PBLS6022D		
			10	PBLS6023D		
			22	PBLS6024D		

[1] Device mounted on a ceramic PCB, Al_2O_3, standard footprint
[2] Device mounted on an FR4 PCB, single-sided copper, tin-plated, and standard footprint

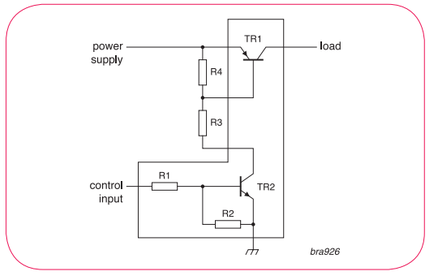
Key features and benefits

- Very small input current drives high load current
- High efficiency and low voltage drop due to low V_{CEsat} (BISS) pass transistor
- Replaces expensive P-MOSFETs
- Inherent reverse-current blocking
- Automotive qualified according to AEC-Q101

Key applications

- Fan driver
- Battery-charge switch
- Supply-line switch
- High-side load

Low V_{CEsat} (BISS) load switch – the optimal choice for supply-line and high-side switches



High-voltage low V_{CEsat} (BISS) transistors

types in **bold** represent new products

Package				SOT223 (SC-73)	SOT89 (SC-62)	SOT23
Size (mm)				6.5 x 3.5 x 1.65	4.5 x 2.5 x 1.5	2.9 x 1.3 x 1.0
P_{tot} (mW)				1700	1300	250
Polarity	V_{CESM} [1]	V_{CEO} (V)	I_C (A)			
NPN	-	150	1	PBHV8115Z	**PBHV8115X**	PBHV8115T
			2	PBHV8215Z		
		180	1			PBHV8118T
		600	0.5	**PBHV8560Z**		
	500	400	0.5	PBHV8540Z	**PBHV8540X**	PBHV8540T
			1	PBHV8140Z		
		500	0.15			PMBTA45
PNP	-	140	4	**PBHV9414Z**		
		150	1	PBHV9115Z	PBHV9115X	PBHV9115T
			2	PBHV9215Z		
		600	0.5	**PBHV9560Z**		
			0.1	**PBHV3160Z**		
	500	400	0.25	PBHV9040Z	**PBHV9040X**	PBHV9040T
			0.5	PBHV9540Z		
		500	0.15	PBHV3160Z		PBHV9050T
			0.25	PBHV9050Z		

[1] Collector-emitter peak voltage

In the spotlight

High-voltage low V_{CEsat} (BISS) transistors in SOT223, SOT23 & SOT89

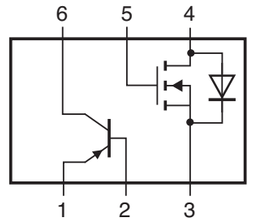
- Voltage V_{CEO} up to 600 V
- Current I_C up to 4 A (continuous), 10 A (peak)
- V_{CEsat} down to 33 mV
- AEC-Q101 qualified

Low V_{CEsat} (BISS) RETs

Package					SOT23	
Size (mm)					2.9 x 1.3 x 1.0	
P_{tot} (mW)					250	
V_{CEO} (V)	I_C (mA)		R1 (kΩ)	R2 (kΩ)	NPN	PNP
40	600	R1 = R2	1	1	PBRN113ET	PBRP113ET
			2.2	2.2	PBRN123ET	PBRP123ET
		R1 ≠ R2	1	10	PBRN113ZT	PBRP113ZT
			2.2	10	PBRN123YT	PBRP123YT

Low V_{CEsat} (BISS) transistor PNP – N-channel MOSFET combination

Package											DFN2020-6 (SOT1118)
Size (mm)											2.0 x 2.0 x 0.62
P_{tot} (mW)											1300
V_{CEO} (V)	I_C (A)	h_{FE} min	h_{FE} max	@ I_C (mA)	@ V_{CE} (V)	R_{CEsat} typ (mΩ)	V_{DS} (V)	V_{GS} (V)	I_D (A)	R_{Dson} typ (mΩ)	
40	2	300	800	100	5	240	30	0.7	0.66	390	PBSM5240PF
		100	-	100	5	240	30	0.7	0.66	390	PBSM5240PFH



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Combination of low V_{CEsat} transistor with N-channel MOSFET in the very small and ultrathin leadless package DFN2020-6 (SOT1118)

Advantages of low V_{CEsat} (BISS) technology

Our BISS (Breakthrough In Small-Signal) transistors show lowest V_{CEsat} values due to an innovative mesh-emitter technology and further technology improvement. They also reduce board space due to improved collector-current capabilities as shown below.

Improved collector-current capabilities

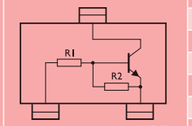
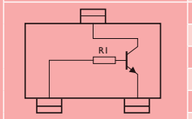
- 17.87 mm² footprint

DFN2020-3 (SOT1061)
1 A
BC51PA
General-purpose transistor

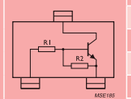
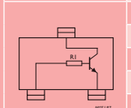
DFN2020-3 (SOT1061)
3 A
PBSS5330PA
BISS transistor technology

DFN2020-3 (SOT1061)
6 A
PBSS5630PA
BISS transistor technology

RETs 100 mA single - Part 1

Package					SOT23		SOT323 (SC-70)	
								
Size (mm)					2.9 x 1.3 x 1.0		2.0 x 1.25 x 0.95	
P_{tot} (mW)					250		200	
V_{CEO} (V)	I_C (mA)	Configuration	R1 (kΩ)	R2 (kΩ)	NPN	PNP	NPN	PNP
50	100		1	1		PDTA113ET		PDTA113EU
			2.2	2.2	PDTC123ET	PDTA123ET	PDTC123EU	PDTA123EU
			4.7	4.7	PDTC143ET	PDTA143ET	PDTC143EU	PDTA143EU
			10	10	PDTC114ET	PDTA114ET	PDTC114EU	PDTA114EU
			22	22	PDTC124ET	PDTA124ET	PDTC124EU	PDTA124EU
			47	47	PDTC144ET	PDTA144ET	PDTC144EU	PDTA144EU
			100	100	PDTC115ET	PDTA115ET	PDTC115EU	PDTA115EU
			1	10		PDTA113ZT		PDTA113ZU
			2.2	10	PDTC123YT	PDTA123YT	PDTC123YU	PDTA123YU
			2.2	47	PDTC123JT	PDTA123JT	PDTC123JU	PDTA123JU
			4.7	10	PDTC143XT	PDTA143XT	PDTC143XU	PDTA143XU
			4.7	47	PDTC143ZT	PDTA143ZT	PDTC143ZU	PDTA143ZU
			10	47	PDTC114YT	PDTA114YT	PDTC114YU	PDTA114YU
			22	47	PDTC124XT	PDTA124XT	PDTC124XU	PDTA124XU
			47	10	PDTC144VT	PDTA144VT	PDTC144VU	PDTA144VU
			47	22	PDTC144WT	PDTA144WT	PDTC144WU	PDTA144WU
			2.2	-	PDTC123TT	PDTA123TT	PDTC123TU	PDTA123TU
			4.7	-	PDTC143TT	PDTA143TT	PDTC143TU	PDTA143TU
			10	-	PDTC114TT	PDTA114TT	PDTC114TU	PDTA114TU
			22	-	PDTC124TT	PDTA124TT	PDTC124TU	PDTA124TU
			47	-	PDTC144TT	PDTA144TT	PDTC144TU	PDTA144TU
			100	-	PDTC115TT	PDTA115TT	PDTC115TU	PDTA115TU

RETs 100 mA single - Part 2

Package					DFN1006-3 (SOT883)		DFN1006B-3 (SOT883B)	
								
Size (mm)					1.0 x 0.6 x 0.48		1.0 x 0.6 x 0.37	
P_{tot} (mW)					250		250	
V_{CEO} (V)	I_C (mA)	Configuration	R1 (kΩ)	R2 (kΩ)	NPN	PNP	NPN	PNP
50	100		1	1		PDTA113EM		PDTA113EMB
			2.2	2.2	PDTC123EM	PDTA123EM	PDTC123EMB	PDTA123EMB
			4.7	4.7	PDTC143EM	PDTA143EM	PDTC143EMB	PDTA143EMB
			10	10	PDTC114EM	PDTA114EM	PDTC114EMB	PDTA114EMB
			22	22	PDTC124EM	PDTA124EM	PDTC124EMB	PDTA124EMB
			47	47	PDTC144EM	PDTA144EM	PDTC144EMB	PDTA144EMB
			100	100	PDTC115EM	PDTA115EM	PDTC115EMB	PDTA115EMB
			1	10		PDTA113ZM		PDTA113ZMB
			2.2	10	PDTC123YM	PDTA123YM	PDTC123YMB	PDTA123YMB
			2.2	47	PDTC123JM	PDTA123JM	PDTC123JMB	PDTA123JMB
			4.7	10	PDTC143XM	PDTA143XM	PDTC143XMB	PDTA143XMB
			4.7	47	PDTC143ZM	PDTA143ZM	PDTC143ZMB	PDTA143ZMB
			10	47	PDTC114YM	PDTA114YM	PDTC114YMB	PDTA114YMB
			22	47	PDTC124XM	PDTA124XM	PDTC124XMB	PDTA124XMB
			47	10	PDTC144VM	PDTA144VM	PDTC144VMB	PDTA144VMB
			47	22	PDTC144WM	PDTA144WM	PDTC144WMB	PDTA144WMB
			2.2	-	PDTC123TM	PDTA123TM	PDTC123TMB	PDTA123TMB
			4.7	-	PDTC143TM	PDTA143TM	PDTC143TMB	PDTA143TMB
			10	-	PDTC114TM	PDTA114TM	PDTC114TMB	PDTA114TMB
			22	-	PDTC124TM	PDTA124TM	PDTC124TMB	PDTA124TMB
			47	-	PDTC144TM	PDTA144TM	PDTC144TMB	PDTA144TMB
			100	-	PDTC115TM	PDTA115TM	PDTC115TMB	PDTA115TMB

RETs 100 mA double

Package					DFN1010B-6 (SOT1216)	SOT363 (SC-88)			SOT666		
											
Size (mm)					1.1 x 1.0 x 0.37	2.0 x 1.25 x 0.95			1.6 x 1.2 x 0.55		
P_{tot} (mW)					350	300			300		
V_{CEO} (V)	I_C (mA)	Configuration	R1 (kΩ)	R2 (kΩ)	NPN / PNP	NPN / NPN	NPN / PNP	PNP / PNP	NPN / NPN	NPN / PNP	PNP / PNP
50	100	R1 = R2	2.2	2.2		PUMH20	PUMD20	PUMB20	PEMH20	PEMD20	PEMB20
			4.7	4.7		PUMH15	PUMD15	PUMB15	PEMH15	PEMD15	PEMB15
			10	10		PUMH11	PUMD3	PUMB11	PEMH11	PEMD3	PEMB11
			22	22		PUMH1	PUMD2	PUMB1	PEMH1	PEMD2	PEMB1
			47	47	PQMD12	PUMH2	PUMD12	PUMB2	PEMH2	PEMD12	PEMB2
			100	100		PUMH24	PUMD24	PUMB24	PEMH24	PEMD24	PEMB24
		R1 ≠ R2	2.2	47		PUMH10	PUMD10	PUMB10	PEMH10	PEMD10	PEMB10
			4.7	10		PUMH18	PUMD18	PUMB18	PEMH18	PEMD18	PEMB18
			4.7	47		PUMH13	PUMD13	PUMB13	PEMH13	PEMD13	PEMB13
			10	47		PUMH9	PUMD9	PUMB9	PEMH9	PEMD9	PEMB9
			22	47		PUMH16	PUMD16	PUMB16	PEMH16	PEMD16	PEMB16
			47	22		PUMH17	PUMD17	PUMB17	PEMH17	PEMD17	PEMB17
			47 / 2.2	47 / 47			PUMD48			PEMD48	
		Only R1	2.2	-		PUMH30	PUMD30	PUMB30	PEMH30	PEMD30	PEMB30
			4.7	-		PUMH7	PUMD6	PUMB3	PEMH7	PEMD6	PEMB3
			10	-		PUMH4	PUMD4	PUMB4	PEMH4	PEMD4	PEMB4
			22	-		PUMH19	PUMD19	PUMB19	PEMH19	PEMD19	PEMB19
			47	-		PUMH14	PUMD14	PUMB14	PEMH14	PEMD14	PEMB14

RETs 500 mA

types in **bold** represent new products

Package					SOT457 (SC-74)		SOT23		SOT323 (SC-70)	
										
Size (mm)					2.9 x 1.5 x 1.0		2.9 x 1.3 x 1.0		2.0 x 1.25 x 0.95	
P_{tot} (mW)					750		250		200	
V_{CEO} (V)	I_C (mA)		R1 (kΩ)	R2 (kΩ)	NPN / NPN	NPN / PNP	NPN	PNP	NPN	PNP
50	500	R1 = R2	1	1			PDTD113ET	PDTB113ET	**PDTD113EU**	**PDTB113EU**
			2.2	2.2			PDTD123ET	PDTB123ET	**PDTD123EU**	**PDTB123EU**
			4.7	4.7			**PDTD143ET**	**PDTB143ET**	**PDTD143EU**	**PDTB143EU**
			10	10			**PDTD114ET**	**PDTB114ET**	**PDTD114EU**	**PDTB114EU**
		R1 ≠ R2	1	10	PIMN31	PIMC31	PDTD113ZT	PDTB113ZT	**PDTD113ZU**	**PDTB113ZU**
			2.2	10			PDTD123YT	PDTB123YT	**PDTD123YU**	**PDTB123YU**
			4.7	10			**PDTD143XT**	**PDTB143XT**	**PDTD143XU**	**PDTB143XU**
		Only R1	2.2	-			PDTD123TT	PDTB123TT		

Single transistors NPN

Package					SOT23	SOT323 (SC-70)	DFN1010D-3 (SOT1215)	DFN1006-3 (SOT883)	DFN1006B-3 (SOT883B)
Size (mm)					2.9 x 1.3 x 1.0	2.0 x 1.25 x 0.95	1.1 x 1.0 x 0.37	1.0 x 0.6 x 0.48	1.0 x 0.6 x 0.37
P_{tot} (mW)					250	200	750	250	250
V_{CEO} (V)	I_C (mA)	h_{FE} min	h_{FE} max	f_T min (MHz)					
25	100	450	1200	100		PMST5089			
30	100	110 - 200	450 - 800	100	BC848B	BC848W			
		350	900	100		PMST5088			
32	100	110 - 420	220 - 800	100	BCW31 / 32 / 33				
		180 - 380	310 - 630	250	BCW60B / C / D				
45	100	110 - 420	220 - 800	100	BC847 / A / B / C	BC847W / AW / BW / CW	BC847AQA / BQA / CQA	BC847AM / BM / CM	BC847AMB / BMB / CMB
		120 - 380	220 - 630	100	BCX70G / H / J / K				
		110 - 200	220 - 450	100	BCW71 / 72				
		500	1250	100	PMBT6429	PMST6429			
50	100	210 - 290	340 - 460	100 - 150	2PD601ART 2PD601ARL 2PD601ASL	2PD601ARW / SW			
		250	650	100	PMBT6428	PMST6428			
60	100	110 - 200	220 - 450	100	BCV71 / 72				
65	100	110 - 200	220 - 450	100	BC846 / A / B	BC846W / AW / BW			BC846BMB
80	100	20	80	60	BSS64				
50	150	120 - 200	240 - 400	80	NXP3875Y / G				
	150	120 - 270	270 - 560	100		2PC4081Q / R / S		2PC4617QM / RM	2PC4617QMB / RMB
	200	210	340	100	2PD601BRL				
		290	460	100	2PD601BSL				
45	500	100 - 250	250 - 600	100	BC817 / -16 / -25 / -40	BC817W / -16W / -25W / -40W	BC817 / -25QA / -40QA		
		100	600	100	BCX19				
50	500	85 - 170	170 - 340	140 - 180	2PD602AQL 2PD602ARL 2PD602ASL	2PD1820AR / S			
60	500	50	-	100		PMSTA05			

Single transistors PNP

Package					SOT23	SOT323 (SC-70)	DFN1010D-3 (SOT1215)	DFN1006-3 (SOT883)	DFN1006B-3 (SOT883B)
Size (mm)					2.9 x 1.3 x 1.0	2.0 x 1.25 x 0.95	1.1 x 1.0 x 0.37	1.0 x 0.6 x 0.48	1.0 x 0.6 x 0.37
P_{tot} (mW)					250	200	750	250	250
V_{CEO} (V)	I_C (mA)	h_{FE} min	h_{FE} max	f_T min (MHz)					
80	500	100	-	50	PMBTA06	PMSTA06			
30	100	125 - 220	500 - 800	100	BC858B	BC858W			
32	100	120 - 215	260 - 500	100	BCW29 / 30				
		180 - 380	310 - 630	100	BCW61B / C / D				
45	100	210 - 290	340 - 460	70 - 80	2PB709ART 2PB709ARL 2PB709ASL	2PB709ARW / SW			
		180 - 380	310 - 630	100	BCX71H / J / K				
		120 - 215	260 - 500	100	BCW69 / 70				
		125 - 420	250 - 800	100	BC857 / A / B / C	BC857W / AW / BW / CW	BC857AQA / BQA / CQA	BC857AM / BM / CM	BC857AMB / BMB / CMB
60	100	120	260	150	BCW89				
65	100	125 - 200	250 - 475	100	BC856 / A / B	BC856W / AW / BW			
100	100	30	-	50	BSS63				
50	150	120 - 270	270 - 560	100		2PA1576Q / R / S		2PA1774QM / RM / SM	2PA1774QMB / RMB / SMB
	200	210	340	100	2PB709BRL				
		290	460	100	2PB709BSL				
25	500	100	600	80	BCX18				
45	500	100 - 250	250 - 600	80	BC807 / -16 / -25 / -40	BC807W / -16W / -25W / -40W	BC807 / -25QA / -40QA		
		100	600	80	BCX17				
50	500	85 - 170	170 - 340	100 - 140	2PB710ARL 2PB710ASL	2PB1219AQ / R / S			
60	500	100	-	50		PMSTA55			
80	500	100	-	50	PMBTA56	PMSTA56			

Double transistors

types in **bold** represent new products

Package						SOT457 (SC-74)	SOT363 (SC-88)	SOT666	DFN1010B-6 (SOT1216)
Size (mm)						2.9 x 1.5 x 1.0	2.0 x 1.25 x 0.95	1.6 x 1.2 x 0.55	1.0 x 1.0 x 0.37
P_{tot} (mW)						750	300	300	350
Polarity	V_{CEO} (V)	I_C (mA)	h_{FE} min	h_{FE} max	f_T min (MHz)				
NPN	40	100	120	450	100		PUMX1	PEMX1	
	45	100	200	450	100	BC847DS	BC847BS	BC847BV	**BC847QAS**
	65	100	110	-	100		BC846S		
			200	450	100	BC846DS	BC846BS		
	50	150	120	560	100		PUMX2		
	45	500	160	400	80	BC817DS			
PNP	40	100	120	450	100	PIMT1	PUMT1	PEMT1	
	45	100	200	450	100		BC857BS	BCC857BV	**BC857QAS**
	65	100	110	-	100		BC856S		
			200	450	100		BC856BS		
	45	500	160	400	80	BC807DS			
NPN / PNP	40	100	120	450	100		PUMZ1	PEMZ1	
	45	100	200	450	100		BC847BPN	BC847BVN	**BC847QAPN**
	50	100	120	560	100	PIMZ2	PUMZ2		
	65	100	200	450	100		BC846BPN		
	12	500	200	-	250 / 100			PEMZ7	
	45	500	160	160	100 / 800	BC817DPN			

Single and double switching transistors

Package							SOT223 (SC-73)	SOT89 (SC-62)	SOT23	SOT323 (SC-70)	SOT363 (SC-88)	SOT666	DFN1006-3 (SOT883)	DFN1006B-3 (SOT883B)
Size (mm)							6.5 x 3.5 x 1.65	4.5 x 2.5 x 1.5	2.9 x 1.3 x 1.0	2.0 x 1.25 x 0.95	2.0 x 1.25 x 0.95	1.6 x 1.2 x 0.55	1.0 x 0.6 x 0.48	1.0 x 0.6 x 0.37
P_{tot} (mW)							1700	1300	250	200	300	300	250	250
Configuration							single	single	single	single	double	double	single	single
Polarity	V_{CEO} (V)	I_C (mA)	h_{FE} min	h_{FE} max	f_T min (MHz)	t_{off} (ns)								
NPN	12	100	40	120	400	20			BSV52					
	40	200	100	300	180	1200			PMBS3904	PMSS3904				
					300	250								
	15	600	40	120	500	20			PMBT2369	PMST2369				
	40	200	100	300	300	250			MMBT3904					
									PMBT3904	PMST3904	PMBT3904YS	PMBT3904VS	PMBT3904M	PMBT3904MB
	30	600	100	300	250	250			PMBT2222	PMST2222				
	40	600	100	300	250	250	PZT4401	PXT4401	PMBT4401	PMST4401				
					300	250			MMBT2222A					
							PZT2222A	PXT2222A	PMBT2222A	PMST2222A				
	40	800	100	300	300	250			BSR14					
PNP	40	100	100	300	150	700			PMBS3906	PMSS3906				
	40	200	100	300	250	300			MMBT3906					
									PMBT3906	PMST3906	PMBT3906YS	PMBT3906VS	PMBT3906M	PMBT3906MB
	40	600	100	300	200	350	PZT4403	PXT4403	PMBT4403	PMST4403				
						365			PMBT2907					
	60	600	100	300	200	300				PMST2907A				
						365			BSR16					
							PZT2907A	PXT2907A	PMBT2907A					
NPN / PNP	40	200	100	300	300 / 250	250 / 300					PMBT3946YPN	PMBT3946VPN		

Medium-power general-purpose transistors

types in **bold** represent new products

Package						SOT223 (SC-73)	SOT89 (SC-62)	DFN2020-3 (SOT1061)	DFN2020D-3 (SOT1061D)
Size (mm)						6.5 x 3.5 x 1.65	4.5 x 2.5 x 1.5	2.0 x 2.0 x 0.62	2.0 x 2.0 x 0.62
P_{tot} (mW)						1700	1300	1300	1300
Polarity	V_{CEO} (V)	I_C (A)	h_{FE} min	h_{FE} max	f_T min (MHz)				
NPN	20	2	85 - 160	375	40	BCP68 / -25	BC868 / -25	BC68PA / BC68-25PA	**BC68PAS / BC68-25PAS**
	45	1	63 - 100	160 - 250	100	BCP54 / -10 / -16	BCX54 / -10 / -16	BC54PA / BC54-10PA / BC54-16PA	**BC54PAS / BC54-10PAS / BC54-16PAS**
	60	1	63 - 100	160 - 250	100	BCP55 / -10 / -16	BCX55 / -10 / -16	BC55PA / BC55-10PA / BC55-16PA	**BC55PAS / BC55-10PAS / BC55-16PAS**
			100	300	100	BSP41	BSR41		
	80	1	63 - 100	160 - 250	100	BCP56 / -10 / -16	BCX56 / -10 / -16	BC56PA / BC56-10PA / BC56-16PA	**BC56PAS / BC56-10PAS / BC56-16PAS**
			40 - 100	120 - 300	100	BSP43	BSR43		
PNP	20	2	85 - 160	250 - 375	40	BCP69 / -16 / -25	BC869 / -16 / -25	BC69PA / BC69-16PA / BC69-25PA	**BC69PAS / BC569-16PAS / BC69-25PAS**
	45	1	63 - 100	160 - 250	115 [1] - 145 [1]	BCP51 / -10 / -16	BCX51 / -10 / -16	BC51PA / BC51-10PA / BC51-16PA	**BC51PAS / BC51-10PAS / BC51-16PAS**
	60	1	63 - 100	160 - 250	100	BCP52 / -10 / -16	BCX52 / -10 / -16	BC52PA / BC52-10PA / BC52-16PA	**BC52PAS / BC52-10PAS / BC52-16PAS**
			40 - 100	120 - 300	100	BSP31	BSR30 / 31		
	80	1	63 - 100	160 - 250	115 [1] - 145 [1]	BCP53 / -10 / -16	BCX53 / -10 / -16	BC53PA / BC53-10PA / BC53-16PA	**BC53PAS / BC53-10PAS / BC53-16PAS**
			40 - 100	120 - 300	100	BSP32 / 33	BSR33		

[1] Typical value

In the spotlight

Medium-power transistors in DFN2020-3 and DFN2020D-3 (with solderable sidepads)

- Excellent electrical perfomance on a small 2 x 2 mm footprint
- 80% board space reduction (DFN2020 vs. SOT89)
- 100% solderable sidepads (DFN2020D-3)
- V_{CEO} ranging from 20 to 80 V
- High collector-current capability I_C up to 2 A
- AEC-Q101 qualified

Package						SOT223 (SC-73)	SOT89 (SC-62)	SOT457 (SC-74)	SOT23	SOT323 (SC-70)
Size (mm)						6.5 x 3.5 x 1.65	4.5 x 2.5 x 1.5	2.9 x 1.5 x 1.0	2.9 x 1.3 x 1.0	2.0 x 1.25 x 0.95
P_{tot} (mW)						1700	1300	750	250	200
Polarity	V_{CEO} (V)	I_C (mA)	h_{FE} min	h_{FE} max	f_T min (MHz)					
NPN	80	100	20	-	60				BSS64	
	140	300	60	250	100				PMBT5550	PMST5550
	160	300	80	250	100				PMBT5551/BSR19A	PMST5551
	250	100	50	-	60	BF722	BF622		BF822	
	300	100	50	-	60	BF720	BF620		BF820	BF820W
			40	-	50	PZTA42	PXTA42		PMBTA42	PMSTA42
	350	100	40	-	70	BSP19	BST39			
	400	300	50	200	20	PZTA44			PMBTA44	
PNP	100	100	30	-	50				BSS63	
	250	100	50	-	60	BF723				
			50	-	60		BF623		BF823	
	300	100	50	-	60		BF621		BF821	
			40	-	50	PZTA92	PXTA92		PMBTA92	PMSTA92
2 x NPN	300	100	40	-	50			PMBTA42DS		

For high-voltage transistors with increased performance please refer to our high-voltage low V_{CEsat} (BISS) transistor portfolio on page 18.

LED driver

Package		SOT457
Size (mm)		2.9 x 1.5 x 1.0
P_{tot} (mW)		750
Vs supply voltage [V]	LED drive current [mA] @ Vs=10V	
40	10	NCR401U
	20	NCR402U
	50	NCR405U

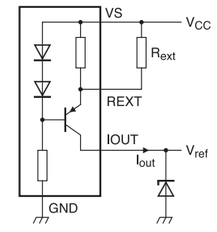
Key features and benefits

- Single-chip constant-current source with reduced component count
- Very small footprint for smaller designs

Key applications

- Constant-current LED driver
- Generic constant-current source
- Active bias control for audio amplifiers

Voltage reference



Constant-current source

Package	SOT353 (SC-88A)						
Size (mm)	2.0 x 1.25 x 0.95						
P_{tot} (mW)	335						
Type	PSSI2021SAY						
Description	maximum supply voltage	maximum supply current	typical stabilized output current	minimum stabilized output current	maximum stabilized output current	typical load stability of stabilized output current	typical output current change over ambient temperature
Parameter	V_S max (V)	I_S max (mA)	I_{out} typ (µA)	I_{out} min (mA)	I_{out} max (mA)	$\Delta I_{out}/I_{out}$ typ (%)	$\Delta I_{out}/(I_{out}{}_{typ\ (\%/K)} * \Delta T_{amb})$
Value	75	2.2	15	0.015	50	0.5	0.15

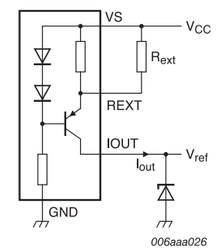
Key features and benefits

- Single-chip constant-current source with reduced component count
- Output current set by an external resistor
- Very small footprint for smaller designs

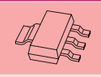
Key applications

- Constant-current LED driver
- Generic constant-current source
- Active bias control for audio amplifiers

Voltage reference



Darlington transistors

Package					SOT223 (SC-73)	SOT89 (SC-62)	SOT23
							
Size (mm)					6.5 x 3.5 x 1.65	4.5 x 2.5 x 1.5	2.9 x 1.3 x 1.0
P_{tot} (mW)					1700	1300	250
Polarity	V_{CEO} (V)	I_C (mA)	h_{FE} min	f_T min (MHz)			
NPN	30	500	10000	125			PMBTA13
			20000		PZTA14	PXTA14	PMBTA14
				220		BCV29	BCV27
	45	1000	2000	200	BSP50	BST50	
	60	500	10000	220		BCV49	BCV47
		1000	2000	200	BSP51	BST51	
	80				BSP52	BST52	
PNP	30	500	20000	125			PMBTA64
				220		BCV28	BCV26
	45	1000	2000	200	BSP60	BST60	
	60	500	10000	220		BCV48	BCV46
		1000	2000	200	BSP61	BST61	
	80				BSP62	BST62	

Schmitt triggers

Package						SOT143B
						
Size (mm)						2.9 x 1.3 x 1.0
P_{tot} (mW)						250
Polarity	V_{CEO} (V) TR1	V_{CEO} (V) TR2	I_C (mA)	h_{FE} min	h_{FE} max	V_{CEsat} typ (mV)	
NPN	30	6	100	110	800	250	BCV63 / B
PNP	30	6	100	220	475	250	BCV64B

Low-noise transistors

Package							SOT23	SOT323 (SC-70)
								
Size (mm)							2.9 x 1.3 x 1.0	2.0 x 1.25 x 0.95
P_{tot} (mW)							250	200
Polarity	V_{CEO} (V)	I_C (mA)	Noise figure max (dB)	h_{FE} min	h_{FE} max	f_T min (MHz)		
NPN	30	100	4	200	450	100	BC849B	BC849BW
				420	800	100	BC849C	BC849CW
	45	100	4	200	450	100	BC850B	BC850BW
				420	800	100	BC850C	BC850CW
PNP	30	100	4	220	475	100	BC859B	BC859BW
				420	800	100	BC859C	BC859CW
	45	100	4	220	475	100	BC860B	BC860BW
				420	800	100	BC860C	BC860CW

Matched-pair transistors

types in **bold** represent new products

Package							SOT143B	SOT457 (SC-74)	SOT353 (SC-88A)	SOT363 (SC-88)		SOT666		LFPAK56D (SOT1205)
														
Size (mm)							2.9 x 1.3 x 1.0	2.9 x 1.5 x 1.0	2.0 x 1.25 x 0.95	2.0 x 1.25 x 0.95		1.6 x 1.2 x 0.55		4.9 x 4.45 x 1.0
P_{tot} (mW)							250	750	300	300		300		1250
Polarity	V_{CEO} (V)	I_C (mA)	h_{FE} min	h_{FE} max	h_{FE1}/h_{FE2}	$V_{BE1} - V_{BE2}$ (mV)								
NPN	30	100	110	800	0.7 [1]	n.a.	BCV61/A/B/C [1]							
	45	100	200	450	0.9 [1]	n.a.	BCM61B [1]							
						2		BCM847DS		BCM847BS		BCM847BV		
					0.95	2			PMP4501G		PMP4501Y		PMP4501V	
					0.98	2			PMP4201G		PMP4201Y		PMP4201V	
	100	3000	150	400	0.95	n.a.								**PHPT610035NK**
	Configuration													
PNP	30	100	100	800	0.7 [1]	n.a.	BCV62/A/B/C [1]							
	45	100	200	450	0.9 [1]	n.a.	BCM62B [1]							
						2		BCM857DS		BCM857BS		BCM857BV		
					0.95	2			PMP5501G		PMP5501Y		PMP5501V	
					0.98	2			PMP5201G		PMP5201Y		PMP5201V	
	65	100	200	450	0.9	2		BCM856DS		BCM856BS				
	100	3000	150	220	0.9	n.a.								**PHPT610035PK**
	Configuration													

[1] I_{C1} / I_{E2}

In the spotlight

New transistors in LFPAK56D (SOT1205) power package

- High thermal power dissipation up to 3 W
- Vceo up to 100 V
- All types AECQ-101 qualified (Ic = 3 A)
- 2 types with current gain matching of 5 and 10%
- Reduced PCB size requirements
- High-temperature applications up to 175 °C
- For LED lighting, motor drive, linear regulators, backlight units, PowerMOS, and IGBT drive

Key features

- Current gain matching to 10, 5, or 2%
- Base-emitter voltage matching to 2 mV
- Choice of standard double transistor pinout or application-optimized pinout
- Common-emitter configuration for 5-pin type
- Range of small, very small, and ultra-small packages

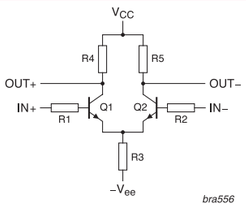
Key benefits

- Improved performance of current mirror and differential amplifier circuits
- Drop-in replacement for standard double transistors (BCM series)
- Simplified board layout (PMP series)
- Eliminates the need for costly additional trimming

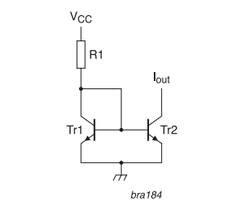
Key applications

- Current mirrors
- Differential and instrumentation amplifiers
- Logarithmic amplifiers
- Comparators

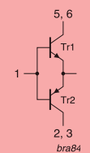
Differential amplifier



Current mirror



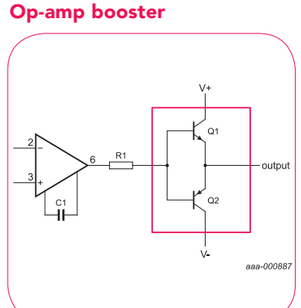
MOSFET driver

V_{CEO} (V)	I_C (mA)	I_{cm} [A]	Type	Package	Remark	Configuration
30	0.1	0.2	BCV65	SOT143B 	General-purpose transistors	
40	0.6	1	PMD2001D	SOT457 	Switching transistors with reduced storage time	
	1	2	PMD3001D		Low V_{CEsat}	

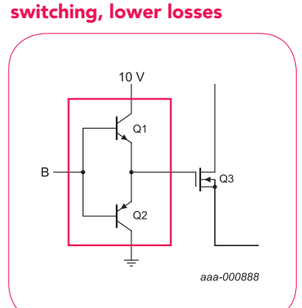
Key features and benefits
- Three different configurations
- Types available with standard, switching, and low V_{CEsat} (BISS) transistors
- Small footprint

Key applications
- Power management
  - (Half) bridge push-pull driver
  - Isolated DC/DC converters
  - Secondary synchronous rectification
- Peripheral driver
  - (Half) bridge push-pull driver
  - Motor driver
  - Brushless DC motor driver
  - Op-amp output current booster

Op-amp booster



MOSFET driver for faster switching, lower losses



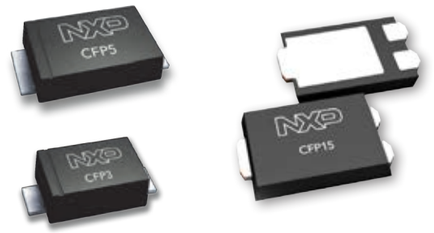
Medium-frequency transistors

Package						SOT23	SOT323 (SC-70)
							
Size (mm)						2.9 x 1.3 x 1.0	2.0 x 1.25 x 0.95
P_{tot} (mW)						250	200
Polarity	V_{CEO} (V)	I_C (mA)	h_{FE} min	h_{FE} max	f_T typ (MHz)		
NPN	15	100	40	-	500	BF570	
	20	25		85	>275	BFS20	BFS20W
		30	65	225	260	BFS19	
	40	25	67	220	380	BF840	
PNP	30	25	25	50	250	BF824	BF824W
	40		50	-	>325	BF550	

Diodes

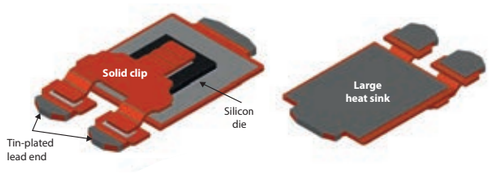
NXP´s FlatPower packages CFP3, CFP5, and CFP15
The medium-power solution for shrinking designs

Small SMD FlatPower packages in three different versions



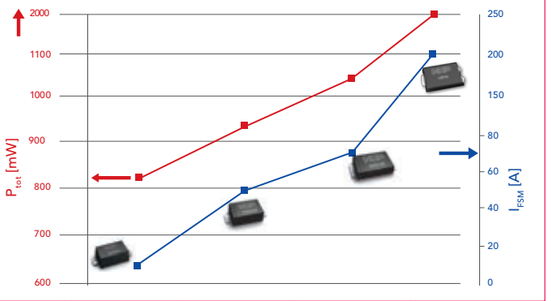
- Flat geometry, of down to 0.78 mm height
- Halogen-free mold compound
- AEC-Q101 qualified

Robust design inside the FlatPower packages



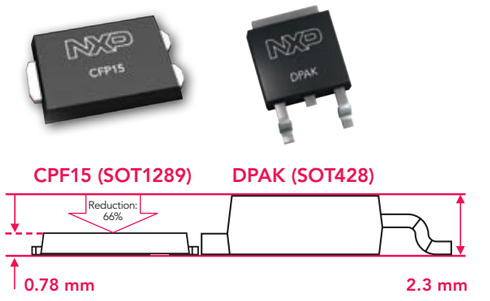
- High-power capability due to clip-bond technology and heatsink
- Automatic optical inspection of solder joint due to tin-plated lead ends
- Benchmark flat design of only 0.7 mm height

Power dissipation (@ 1 cm²), and I_{FSM} per package



Package name	SOD123F wire bond	CFP3 (SOD123W) small clip	CFP5 (SOD128) large clip	CFP15 (SOT1289) dual clip
Body size (w x l x h)	2.6 x 1.6 x 1.1	2.6 x 1.7 x 1.0	3.8 x 2.5 x 1.0	5.8 x 4.3 x 0.78

Package height comparison: CFP15 - DPAK



The new NXP CFP15 package delivers a 66% reduction in height compared to a conventional DPAK.

Schottky diodes

Enabling superior high P_{tot} and I_{FSM}

- Huge portfolio of Schottky diodes available
- 20 to 100 V, 1 to 15 A, very low V_F
- Junction temperature up to 175 °C

TVS diodes

Can replace SMA and SMB products

- Complete TVS series available
- 3.5 to 64 V, 400 and 600 W
- Junction temperature up to 185 °C

NXP offers more than 200 products in FlatPower packages, to support a wide range of applications for medium-power rectification and surge protection.

Medium-power low V_F Schottky rectifiers single ≥ 1 A - FlatPower packages

types in **bold** represent new products

I_F max (A)	V_R max (V)	V_F max (mV) @ I_F max	I_R max (mA) @ V_R max	Package	CFP15 (SOT1289)	CFP5 (SOD128)	CFP3 (SOD123W)
				Size (mm)	5.8 x 4.3 x 0.78	3.8 x 2.5 x 1.0	2.6 x 1.7 x 1.0
				P_{tot} (mW) @ 1 cm²	2150	1050	950
				Optimization			
1	20	340	1	Low V_F			PMEG2010ER
		450	0.05	Low I_R			PMEG2010BER
	30	360	1.5	Low V_F		PMEG3010EP	PMEG3010ER
		450	0.05	Low I_R		PMEG3010BEP	PMEG3010BER
	40	490		Low V_F		PMEG4010EP	PMEG4010ER
				Low V_F		PMEG4010ETP	PMEG4010ETR
	60	530	0.06	Low V_F		PMEG6010EP	PMEG6010ER
		530		Low V_F			PMEG6010ETR
		660	0.0003	Low I_R			PMEG6010ELR
	100	770	0.00015	Low I_R			PMEG10010ELR
2	30	360	3	Low V_F		PMEG3020EP	
		420	1.5	Low V_F		PMEG3020CEP	PMEG3020ER
		450	0.1	Low I_R		PMEG3020BEP	
		520	0.05	Low I_R		PMEG3020DEP	PMEG3020BER
	40	490	0.1	Low V_F		PMEG4020EP	PMEG4020ER
				Low V_F		PMEG4020ETP	PMEG4020ETR
	60	530	0.2	Low V_F		PMEG6020EP	PMEG6020ER
				Low V_F		PMEG6020ETP	PMEG6020ETR
		680	0.0007	Low I_R		PMEG6020AELP	PMEG6020AELR
		760	0.0003	Low I_R			PMEG6020ELR
	100	770		Low I_R		PMEG10020AELP	PMEG10020AELR
		830	0.00015	Low I_R			PMEG10020ELR
3	30	360	5	Low V_F		PMEG3030EP	
		450	0.15	Low I_R		PMEG3030BEP	
	40	490	0.2	Low V_F		PMEG4030EP	
				Low V_F		PMEG4030ETP	
		540	0.1	Low I_R			PMEG4030ER
	60	530	0.2	Low V_F		PMEG6030EP	
		475	0.4	Low V_F		PMEG6030EVP	
		530	0.2	Low V_F		PMEG6030ETP	
		690	0.001	LLow I_R		PMEG6030ELP	
	100	770	0.00045	Low I_R		PMEG10030ELP	
4.5	60	530	0.4	Low V_F		PMEG6045ETP	
5	30	360	8	Low V_F		PMEG3050EP	
		450	0.25	Low I_R		PMEG3050BEP	
	40	490	0.3	Low V_F		PMEG4050EP	
				Low V_F		PMEG4050ETP	
	45			Low V_F	**PMEG045V050EPD**		
	60	560	0.4	Low V_F	**PMEG060V050EPD**		
10	45	490	0.6	Low V_F	**PMEG045V1000EPD**		
				Low V_F	PMEG45U10EPD		
		540	0.5	Low I_R	PMEG45A10EPD		
	60	560	0.7	Low V_F	**PMEG060V100EPD**		
15	45	490	0.03	Low I_R	**PMEG045T150EPD**		
			1	Low V_F	**PMEG045V150EPD**		
	50	500		Low V_F	**PMEG050V150EPD**		

Medium-power low V_F Schottky rectifiers single ≥ 100 mA - DSN packages

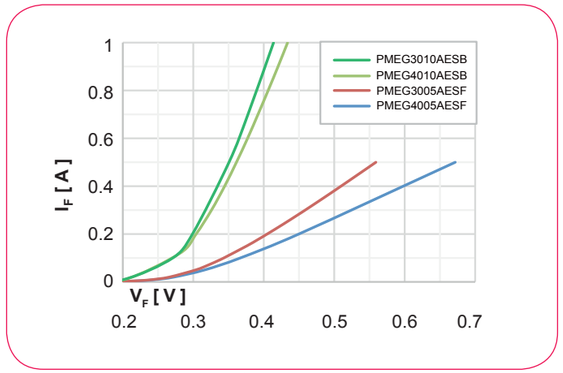
types in **bold** represent new products

I_F max (A)	V_R max (V)	V_F max (mV) @ I_F max	I_R max (mA) @ V_R max	Package	DSN0603-2 (SOD962)	DSN1006-2 (SOD993)	DSN1006U-2 (SOD995)
				Size (mm)	0.6 x 0.3 x 0.3	1.0 x 0.6 x 0.28	1.0 x 0.6 x 0.28
				P_{tot} (mW) @ 1 cm²	525	tbd	tbd
				Optimization			
0.1	12	250	2	Low V_F	**PMEG1201AESF**		
0.2	20	420	0.045	Low V_F	PMEG2002AESF		
		490	0.0035	Low I_R	PMEG2002ESF		
	30	470	0.08	Low V_F	**PMEG3002AESF**		
		535	0.009	Low I_R	**PMEG3002ESF**		
	40	525	0.08	Low V_F	**PMEG4002AESF**		
		600	0.0065	Low I_R	**PMEG4002ESF**		
0.5	20	550	0.045	Low V_F	**PMEG2005AESF**		
		620	0.0035	Low I_R	**PMEG2005ESF**		
	30	630	0.08	Low V_F	**PMEG3005AESF**		
		720	0.009	Low I_R	**PMEG3005ESF**		
	40	820	0.08	Low V_F	**PMEG4005AESF**		
		880	0.0065	Low I_R	**PMEG4005ESF**		
1	30	typ. 415	typ. 0.3	Low V_F		**PMEG3010AESB**	**PMEG3010AESA**
	40	typ. 435	typ. 0.325	Low V_F		**PMEG4010AESB**	

Forward characteristic survey of Schottkys in DSN1006-2

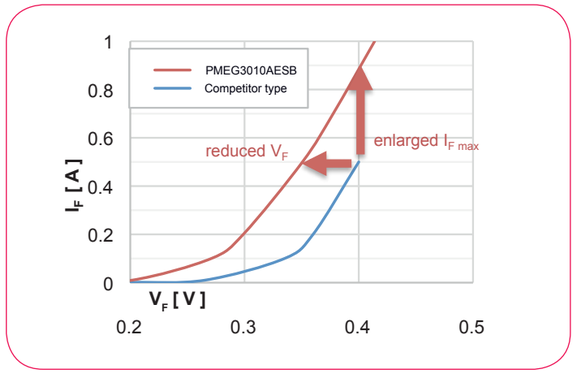
V_R:30 V, I_F: I_A (typical data)

Selected DSN Schottky rectifier



This diagram shows the broad variety of the DSN portfolio

PMEG3010AESB versus competitor type



NXP type has higher forward current specified and has benchmark low V_F

In the spotlight

PMEG3010AESB and PMEG4010AESB, low V_F Schottky rectifier

- 30 / 40 V, 1A Schottky rectifier in CSP DSN1006-2 (SOD993) package
- Low V_F typ = 415 / 435 mV @ 1 A
- High surge capability up to 8 A
- Ideal for shrinked designs and 'small power' applications
- Ideal for LED backlighting in mobile applications

Medium-power low V_F Schottky rectifiers single ≥ 200 mA - Leadless (DFN) packages

types in **bold** represent new products

I_F max (A)	V_R max (V)	V_F max (mV) @ I_F max	I_R max (mA) @ V_R max	Package	DFN2020-3 (SOT1061)	DFN2020D-3 (SOT1061D)	DFN1608D-2 (SOD1608)	DFN1006-2 (SOD882)	DFN1006D-2 (SOD882D)
				Size (mm)	2.0 x 2.0 x 0.62	2.0 x 2.0 x 0.62	1.6 x 0.8 x 0.37	1.0 x 0.6 x 0.48	1.0 x 0.6 x 0.37
				P_{tot} (mW) @ 1 cm²	960	960	780	565	660
				Optimization					
0.2	30	480	0.05	low V_F				PMEG3002AEL	PMEG3002AELD
	40	600	0.01	low I_R				PMEG4002EL	PMEG4002ELD
	60	600	0.1	low V_F				**PMEG6002EL**	PMEG6002ELD
0.5	20	390	0.2	low V_F					PMEG2005BELD
		410	0.3	low V_F			PMEG2005EPK		
		440	1.5	low V_F				PMEG2005AEL	PMEG2005AELD
		500	0.03	low I_R				PMEG2005EL	PMEG2005ELD
	30	500	0.5	low V_F				PMEG3005EL	PMEG3005ELD
	40	590	0.01	low I_R			PMEG4005EPK		
1	20	375	1.9	low V_F	PMEG2010EPA	**PMEG2010EPAS**			
		415	0.6	low V_F			PMEG2010EPK		
		490	0.2	low V_F					PMEG2010BELD
	40	600	0.02	low I_R			PMEG4010EPK		
1.5	20	420	0.9	low V_F			PMEG2015EPK		
	40	610	0.03	low I_R			PMEG4015EPK		
2	20	420	1.9	low V_F	PMEG2020EPA	**PMEG2020EPAS**			
		450	0.9	low V_F			PMEG2020EPK		
	30	470	2.5	low V_F	PMEG3020EPA	**PMEG3020EPAS**			
	40	535	0.1	low V_F	PMEG4020EPA	**PMEG4020EPAS**			
	60	530	0.2	low V_F			PMEG4020EPK		
		575	0.25	low V_F	PMEG6020EPA	**PMEG6020EPAS**			

Features and benefits

- 33% lower V_F on same footprint
- Low profile of 0.37 mm
- Solderable side pads
- Visual solder inspection

Applications

- Handheld equipment
- Smartphone backlight units
- Battery chargers
- Shrinked PCB designs

Differentiated portfolio

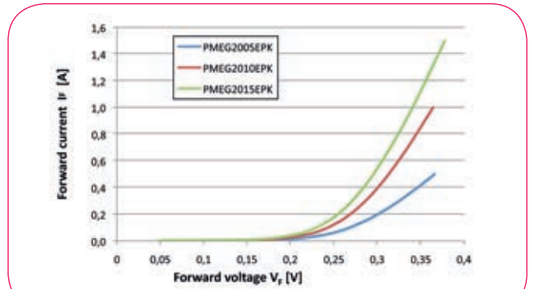
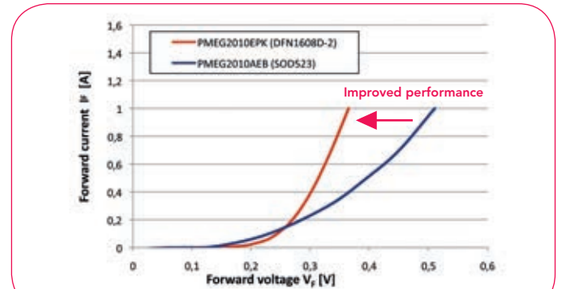


Diagram shows the variety of characteristics in DFN1608D-2 (SOD1608)

with best performance



PMEG2010EPK shows significant V_F improvement compared to the SOD523 device

Medium-power low V_F Schottky rectifiers single ≥ 200 mA - Leaded packages

I_F max (A)	V_R max (V)	V_F max (mV) @ I_F max	I_R max (mA) @ V_R max	Package	SOT457 (SC-74)	SOT23	SOD123F	SOT323 (SC-70)	SOD323F (SC-90)	SOD323 (SC-76)	SOT666	SOD523 (SC-79)
				Size (mm)	2.9 x 1.5 x 1.0	2.9 x 1.3 x 1.0	2.6 x 1.6 x 1.1	2.0 x 1.25 x 0.95	1.7 x 1.25 x 0.7	1.7 x 1.25 x 0.95	1.6 x 1.2 x 0.55	1.2 x 0.8 x 0.6
				P_{tot} (mW) @ 1 cm²	540	420	830	400	830	570	570	500
				Optimization								
0.2	30	480	0.05	low V_F					PMEG3002EJ			PMEG3002AEB
	40	600	0.01	low I_R					PMEG4002EJ			PMEG4002EB
	60	600	0.1	low V_F					PMEG6002EJ			PMEG6002EB
0.5	20	390	0.2	low V_F		PMEG2005ET	PMEG2005EH		PMEG2005EJ	PMEG2005AEA	PMEG2005AEV	
		480	0.03	low I_R								PMEG2005EB
	30	430	0.15	low V_F		PMEG3005ET	PMEG3005EH		PMEG3005EJ	PMEG3005AEA	PMEG3005AEV	
		500	0.5	low V_F								PMEG3005EB
	40	470	0.1	low V_F		PMEG4005ET	PMEG4005EH		PMEG4005EJ	PMEG4005AEA	PMEG4005AEV	
		550	1.1	low V_F		BAT720		1PS70SB20				
1	20	430	0.2	low V_F		PMEG2010AET	PMEG2010AEH					
		500	0.2	low V_F		PMEG2010ET	PMEG2010EH		PMEG2010EJ	PMEG2010BEA	PMEG2010BEV	
		550	0.07	low I_R					PMEG2010AEJ	PMEG2010EA BAT760	PMEG2010EV BAT960	
		620	1.5	low V_F								PMEG2010AEB
	30	450	1	low V_F	1PS74SB23							
		520	0.1	low I_R			PMEG3010CEH		PMEG3010CEJ			
		560	0.15	low V_F		PMEG3010ET	PMEG3010EH		PMEG3010EJ	PMEG3010BEA	PMEG3010BEV	
		680	0.5	low V_F								PMEG3010EB
		570	0.05	low I_R			PMEG4010CEH		PMEG4010CEJ			
		600	0.02	low I_R								
	40	640	0.05	low V_F		PMEG4010ET	PMEG4010EH		PMEG4010EJ	PMEG4010BEA	PMEG4010BEV	
	60	650	0.35	low V_F	PMEG6010AED							
		660	0.05	low I_R			PMEG6010CEH		PMEG6010CEJ			
1.5	20	660	0.2	low I_R			PMEG2015EH		PMEG2015EJ	PMEG2015EA	PMEG2015EV	
	30	500	1	low V_F			PMEG3015EH		PMEG3015EJ		PMEG3015EV	
2	10	460	3	low V_F			PMEG1020EH		PMEG1020EJ	PMEG1020EA	PMEG1020EV	
	20	525	0.2	low V_F			PMEG2020EH		PMEG2020EJ	PMEG2020AEA		
	30	620	1	low V_F			PMEG3020EH		PMEG3020EJ			
3	10	530	3	low V_F			PMEG1030EH		PMEG1030EJ			

In the spotlight

Schottky Rectifier in SOD123F and SOD323F

- Broad portfolio base of 36 types, 20 / 60 V, 0.2 - 3 A
- Optimized either for low V_F or low I_R
- High surge capability up to 10 A
- High thermal capability due to flat-lead design
- AEC-Q101 qualified
- Ideal for DC/DC conversion, free-wheeling, reverse polarity protection

Medium-power low V_F Schottky rectifiers dual ≥ 200 mA

types in **bold** represent new products

I_F max (A)	V_R max (V)	V_F max (mV) @ I_F max	I_R max (mA) @ V_R max	Optimization	Package	SOT223 (SC-73)	SOT23	DFN2020-3 (SOT1061)	DFN2020D-3 (SOT1061D)	SOT666
					Size (mm)	6.5 x 3.5 x 1.65	2.9 x 1.3 x 1.0	2.0 x 2.0 x 0.62	2.0 x 2.0 x 0.63	1.6 x 1.2 x 0.55
					P_{tot} (mW) @ 1 cm²	1500	250	1000	1001	300
0.2	30	480	0.03	low V_F						PMEG3002TV
	60	600	0.1	low V_F						PMEG6002TV
0.5	20	390	0.2	low V_F			PMEG2005CT			
	30	430	0.15	low V_F			PMEG3005CT			
	40	470	0.1	low V_F			PMEG4005CT			
1.0	25	450	1.0	low V_F		BAT120S				
				low V_F		BAT120C				
				low V_F		BAT120A				
	40	500	0.05	low V_F				PMEG4010CPA	**PMEG4010CPAS**	
		540	0.06	low V_F				PMEG6010CPA	**PMEG6010CPAS**	
	60	650	0.35	low V_F		BAT160S				
				low V_F		BAT160C				
				low V_F		BAT160A				
2.0	20	420	1.0	low V_F				PMEG2020CPA	**PMEG2020CPAS**	
	30	440	2.0	low V_F						

Low V_F (MEGA) Schottky rectifier nomenclature

PMEG 40 10 A E T P

NXP MEGA Schottky rectifier

Max. reverse voltage in V
e.g. 40 = 40 V

Cont. foward current in A
e.g. 10 = 1.0 A

Variant number (optional)

Internal configuration:
A = CA
C = CC
E = single
P = double, parallel
R = tripple, antiparallel
S = series
V = tripple
W = CA and CC
X = 2 x series
Y = 2 x CC
Z = 2 x CA

Variant number (optional)
L = low I_R
T = high temperature
V = low I_R and low V_F

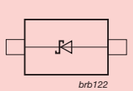
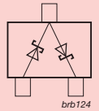
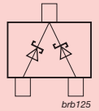
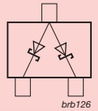
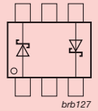
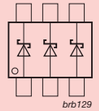
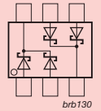
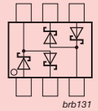
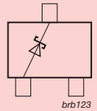
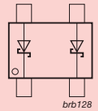
Package indicator:
A = SOD323
B = SOD523
D = SOT457
H = SOD123
J = SOD323F
L = DFN1006-2 (SOD882)
LD = DFN1006D-2 (SOD882D)
P = SOD128
PA = DFN2020-3 (SOT1061)

PAS = DFN2020D-3 (SOT1061D)
PD = CFP15 (SOT1289)
PK = DFN1608D-2 (SOD1608)
R = SOD123W
SA = DSN1006U-2 (SOD995)
SB = DSN1006-2 (SOD993)
SF = DSN0603-2 (SOD962)
T = SOT23
V = SOT666

Schottky barrier diodes and rectifiers

General-purpose Schottky diodes ≤ 250 mA

I_F max (mA)	V_R max (V)	V_F max (mV)	@ I_F (mA)	I_R max (µA)	@ V_R (V)	Package	SOD80C (MiniMelf)	SOD68 (DO-34)	SOT23	SOT143B		SOD123F	SOT323 (SC-70)	SOT363 (SC-88)	SOD323F (SC-90)	SOD323 (SC-76)	SOT666	SOD523 (SC-79)	DFN1006-2 (SOD882)/ DFN1006-3 (SOT883)
						Size (mm)	3.5 x 1.5 x 1.5	3.04 x 1.6 x 0.55	2.9 x 1.3 x 1.0	2.9 x 1.3 x 1.0		2.6 x 1.6 x 1.1	2.0 x 1.25 x 0.95	2.0 x 1.25 x 0.95	1.7 x 1.25 x 0.7	1.7 x 1.25 x 0.95	1.6 x 1.2 x 0.55	1.2 x 0.8 x 0.6	1.0 x 0.6 x 0.48
						P_{tot} (mW)	300	500	250	250		830	250	300	550	400	300	500	250
70	70	750	10	0.1	50	single			BAS70			BAS70H	BAS70W			1PS76SB70		1PS79SB70	BAS70L
						dual series			BAS70-04				BAS70-04W						
						dual c.c.			BAS70-05				BAS70-05W						
						dual c.a.			BAS70-06				BAS70-06W						
						dual isolated				BAS70-07				BAS70-07S			BAS70-07V		
						triple isolated											BAS70VV		
						quad 2x series								BAS70XY					
120	40	370	1	0.5	30	single										RB751V40		RB751S40	RB751CS40
		500	10	1	30	single			BAS40			BAS40H	BAS40W			1PS76SB40		1PS79SB40	BAS40L
						dual series			BAS40-04				BAS40-04W						
						dual c.c.			BAS40-05				BAS40-05W						
						dual c.a.			BAS40-06				BAS40-06W						
						dual isolated				BAS40-07							BAS40-07V		
						quad c.c./c.c.								1PS88SB48			BAS40-05V		
						quad 2x series								BAS40XY					
200	30	300	10	30	10	single												1PS79SB31	
		340	10	2	25	single			BAT754										
						dual series			BAT754S										
						dual c.c.			BAT754C										
						dual c.a.			BAT754A										
						triple isolated								BAT754L					
		400	10	2	25	single	BAS85	BAT85	BAT54			BAT54H	BAT54W		BAT54J	1PS76SB10		1PS79SB10	BAT54L
						dual series			BAT54S				BAT54SW						
						dual c.c.			BAT54C				BAT54CW						BAT54CM
						dual c.a.			BAT54A				BAT54AW						
						dual isolated				BAT74				BAT74S			BAT74V		
						triple isolated											BAT54VV		
						quad c.c./c.c.											BAT54CV		
						quad 2x series								BAT54XY					
		500	200	30	10	single												RB521S30	RB521CS30L
		600	200	1	10	single												RB520S30	RB520CS30L
	40	300	10	15	30	single			BAT721							1PS76SB21			
						dual series			BAT721S										
						dual c.c.			BAT721C										
						dual c.a.			BAT721A										
		360	10	0.5	25	single												1PS79SB30	
		420	30	0.5	25	single							BAT854W						
						dual series							BAT854SW						
						dual c.c.							BAT854CW						
						dual c.a.							BAT854AW						
	50	450	10	5	40	single	BAS86	BAT86											
250	100	850	250	4	75	single						BAT46WH			BAT46WJ				

Single	Dual series	Dual c.c.	Dual c.a.	Dual isolated	Triple isolated	Quad c.c./c.c.	Quad 2x series
 brb122	 brb124	 brb125	 brb126	 brb127	 brb129	 brb130	 brb131
 brb123				 brb128			
 aaa-001765							

Low-capacitance Schottky diodes

I_F max (mA)	V_R max (V)	V_F max (mV)	@ I_F (mA)	C_d max (pF) @ V_R = 0 V	Package	SOT23	SOT323 (SC-70)	SOT363 (SC-88)	SOD323 (SC-76)	SOT666	SOD523 (SC-79)	DFN1006-2 (SOD882)
					Size (mm)	2.9 x 1.3 x 1.0	2.0 x 1.25 x 0.95	2.0 x 1.25 x 0.95	1.7 x 1.25 x 0.95	1.6 x 1.2 x 0.55	1.2 x 0.8 x 0.6	1.0 x 0.6 x 0.48
					P_{tot} (mW)	250	250	300	400	300	500	250
30	4	450	1	1	single	BAT17			1PS76SB17		1PS79SB17	
					triple isolated					1PS66SB17		
					dual series	PMBD353 PMBD354 [1]						
	15	340	1	1	single		1PS70SB82					1PS10SB82
					triple isolated			1PS88SB82		1PS66SB82		
					dual series		1PS70SB84					
					dual c.c.		1PS70SB85					
					dual c.a.		1PS70SB86					

[1] Diodes have matched capacitance

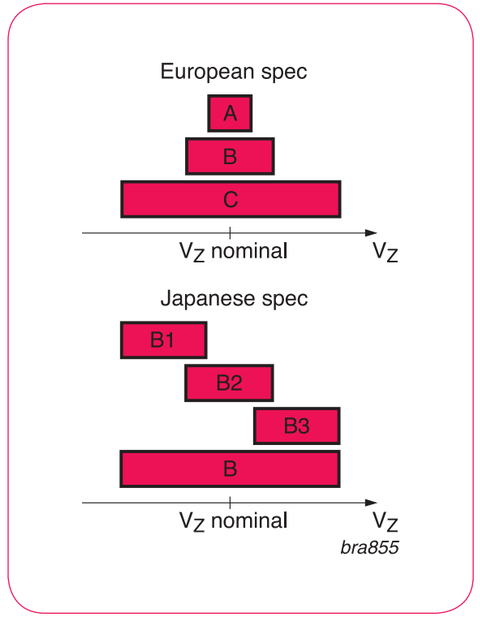
General-purpose Zener diodes

I_F max (mA)	P_{ZSM} (W)	V_Z nom (V)	V_Z tolerance	Note	Configuration	Series	Package	Size (mm)	P_{tot} (mW)
500	-	3.3~24	C	Europe	Single	1N47xxA series	SOD66 (DO-41)	4.8 x 2.6 x 0.81	1000
	60	3.6~75				BZV85 series			
250	-	2.1~36	About 2%	Special	Single	NZX series	SOD27 (DO-35)	4.25 x 1.85 x 0.56	400
	40	2.4~75	B, C	Europe		BZX79 series			
400	40	2.4~75	C	Europe	Single	BZV90 series	SOT223 (SC-73)	6.5 x 3.5 x 1.65	1500
250	40	2.4~75	C	Europe	Single	BZV49 series	SOT89 (SC-62)	4.5 x 2.5 x 1.5	1000
250	40	2.4~75	B, C	Europe	Single	BZV55 series	SOD80C (MiniMelf)	3.5 x 1.5 x 1.5	400
200	40	2.4~75	B, C	Europe	Dual c.a.	BZB84 series	SOT23	2.9 x 1.3 x 1.0	250
			A, B, C		Single	BZX84 series			
250	30	5~6.8	0.2 V	Ave		PLVA600A series			
			0.2 V	Ave	Dual c.a.	PLVA2600A series			
250	-	3.0~30	About 2.5%	Special	Single	NZH series	SOD123F	2.6 x 1.6 x 1.1	830
	40	2.4~75	B, C	Europe		BZT52H series			
200	40	2.7~24	B2	Japan	Dual isolated	PZUxDB2 series	SOT353 (SC-88A)	2.0 x 1.25 x 0.95	300
200	40	2.4~15	C	Europe	Dual c.a.	BZB784 series	SOT323 (SC-70)	2.0 x 1.25 x 0.95	350
200	30	100	C	Europe	Back-to-back	BZB100A	SOD323 (SC-76)	1.7 x 1.25 x 0.95	300
	40	2.4~36	B2	Japan	Single	PDZ-B series			
250	40	2.4~75	B, C	Europe		BZX384 series			
200	40	2.4~36	B, B1, B2, B3	Japan		PZUxBA series			
200	60	100	C	Europe	Single	BZX100A	SOD323F (SC-90)	1.7 x 1.25 x 0.7	550
200	40	2.4~36	B, B1, B2, B3	Japan		PZUxB series			
250	40	2.4~75	B, C	Europe		BZX84J series			
200	40	2.4~15	C	Europe	Dual c.a.	BZB984 series	SOT663	1.6 x 1.2 x 0.55	350
200	40	2.4~75	B, C	Europe	Single	BZX585 series	SOD523 (SC-79)	1.2 x 0.8 x 0.6	300
200	40	2.4~75	B, C	Europe	Single	BZX884 series	DFN1006-2 (SOD882)	1.0 x 0.6 x 0.48	250
		2.4~36	B, B2	Japan		PZUxBL series			
250	40	2.4~30	B	Europe	Single	TDZxJ series	SOD323F	1.7 x 1.25 x 0.7	500

Notes:
Japan: B selection: app. 5% V_z tolerance, B1, B2, B3 selections: app. 2% V_z tolerance in sequential intervals
Europe: A selection: app. 1% V_z tolerance, B selection: app. 2% V_z tolerance, C selection: app. 5% V_z tolerance; the selections are in overlapping intervals
Ave: low-voltage avalanche regulator diodes
Dual c.a.: dual common anode

Zener diodes specifications

Differences in Zener specifications



Japanese spec (PZU, PDZ)

y =	B-series	B1-series	B2-series	B3-series
	± 5%	± 2%	± 2%	± 2%
	V_z (V)	V_z (V)	V_z (V)	V_z (V)
PZU2.4y	2.3 - 2.6	-	-	-
PZU2.7y	2.5 - 2.9	2.5 - 2.75	2.65 - 2.9	-
PZU3.0y	2.8 - 3.2	2.8 - 3.05	2.95 - 3.2	-
PZU3.3y	3.1 - 3.5	3.1 - 3.35	3.25 - 3.5	-
PZU3.6y	3.4 - 3.8	3.4 - 3.65	3.55 - 3.8	-
PZU3.9y	3.7 - 4.1	3.7 - 3.97	3.87 - 4.1	-
PZU4.3y	4.01 - 4.48	4.01 - 4.21	4.15 - 4.34	4.28 - 4.48
PZU4.7y	4.42 - 4.9	4.42 - 4.61	4.55 - 4.75	4.69 - 4.9
PZU5.1y	4.84 - 5.37	4.84 - 5.04	4.98 - 5.2	5.14 - 5.37
PZU5.6y	5.31 - 5.92	5.31 - 5.55	5.49 - 5.73	5.67 - 5.92
PZU6.2y	5.86 - 6.53	5.86 - 6.12	6.06 - 6.33	6.26 - 6.53
PZU6.8y	6.47 - 7.14	6.47 - 6.73	6.65 - 6.93	6.86 - 7.14
PZU7.5y	7.06 - 7.84	7.06 - 7.36	7.28 - 7.6	7.52 - 7.84
PZU8.2y	7.76 - 8.64	7.76 - 8.1	8.02 - 8.36	8.28 - 8.64
PZU9.1y	8.56 - 9.55	8.56 - 8.93	8.85 - 9.23	9.15 - 9.55
PZU10y	9.45 - 10.55	9.45 - 9.87	9.77 - 10.21	10.11 - 10.55
PZU11y	10.44 - 11.56	10.44 - 10.88	10.76 - 11.22	11.1 - 11.56
PZU12y	11.42 - 12.6	11.42 - 11.9	11.74 - 12.24	12.08 - 12.6
PZU13y	12.47 - 13.96	12.47 - 13.03	12.91 - 13.49	13.37 - 13.96
PZU14y	-	-	13.7 - 14.3	-
PZU15y	13.84 - 15.52	13.84 - 14.46	14.34 - 14.98	14.85 - 15.52
PZU16y	15.37 - 17.09	15.37 - 16.01	15.85 - 16.51	16.35 - 17.09
PZU18y	16.94 - 19.03	16.94 - 17.7	17.56 - 18.35	18.21 - 19.03
PZU20y	18.86 - 21.08	18.86 - 19.7	19.52 - 20.39	20.21 - 21.08
PZU22y	20.88 - 23.17	20.88 - 21.77	21.54 - 22.47	22.23 - 23.17
PZU24y	22.93 - 25.57	22.93 - 23.96	23.72 - 24.78	24.54 - 25.57
PZU27y	25.1 - 28.9	-	-	-
PZU30y	28 - 32	-	-	-
PZU33y	31 - 35	-	-	-
PZU36y	34 - 38	-	-	-

European spec (BZV, BZX, BZB, 1N47)

y =	C-series	B-series	A-series
	±5%	±2%	±1%
	V_z (V)	V_z (V)	V_z (V)
BZX84-y2V4	2.2 - 2.6	2.35 - 2.45	2.37 - 2.43
BZX84-y2V7	2.5 - 2.9	2.65 - 2.75	2.67 - 2.73
BZX84-y3V0	2.8 - 3.2	2.94 - 3.06	2.97 - 3.03
BZX84-y3V3	3.1 - 3.5	3.23 - 3.37	3.26 - 3.34
BZX84-y3V6	3.4 - 3.8	3.53 - 3.67	3.56 - 3.64
BZX84-y3V9	3.7 - 4.1	3.82 - 3.98	3.86 - 3.94
BZX84-y4V3	4 - 4.6	4.21 - 4.39	4.25 - 4.35
BZX84-y4V7	4.4 - 5	4.61 - 4.79	4.65 - 4.75
BZX84-y5V1	4.8 - 5.4	5 - 5.2	5.04 - 5.16
BZX84-y5V6	5.2 - 6	5.49 - 5.71	5.54 - 5.66
BZX84-y6V2	5.8 - 6.6	6.08 - 6.32	6.13 - 6.27
BZX84-y6V8	6.4 - 7.2	6.66 - 6.94	6.73 - 6.87
BZX84-y7V5	7 - 7.9	7.35 - 7.65	7.42 - 7.58
BZX84-y8V2	7.7 - 8.7	8.04 - 8.36	8.11 - 8.29
BZX84-y9V1	8.5 - 9.6	8.92 - 9.28	9 - 9.2
BZX84-y10	9.4 - 10.6	9.8 - 10.2	9.9 - 10.1
BZX84-y11	10.4 - 11.6	10.8 - 11.2	10.8 - 11.11
BZX84-y12	11.4 - 12.7	11.8 - 12.2	11.88 - 12.12
BZX84-y13	12.4 - 14.1	12.7 - 13.3	12.87 - 13.13
BZX84-y15	13.8 - 15.6	14.7 - 15.3	14.85 - 15.15
BZX84-y16	15.3 - 17.1	15.7 - 16.3	15.84 - 16.16
BZX84-y18	16.8 - 19.1	17.6 - 18.4	17.82 - 18.18
BZX84-y20	18.8 - 21.2	19.6 - 20.4	19.8 - 20.2
BZX84-y22	20.8 - 23.3	21.6 - 22.4	21.78 - 22.22
BZX84-y24	22.8 - 25.6	23.5 - 24.5	23.76 - 24.24
BZX84-y27	25.1 - 28.9	26.5 - 27.5	26.73 - 27.27
BZX84-y30	28 - 32	29.4 - 30.6	29.70 - 30.30
BZX84-y33	31 - 35	32.3 - 33.7	32.67 - 33.33
BZX84-y36	34 - 38	35.3 - 36.7	35.64 - 36.36
BZX84-y39	37 - 41	38.2 - 39.8	38.61 - 39.39
BZX84-y43	40 - 46	42.1 - 43.9	42.57 - 43.43
BZX84-y47	44 - 50	46.1 - 47.9	-
BZX84-y51	48 - 54	50 - 52	50.49 - 51.51
BZX84-y56	52 - 60	54.9 - 57.1	-
BZX84-y62	58 - 66	60.8 - 63.2	-
BZX84-y68	64 - 72	66.6 - 69.4	-
BZX84-y75	70 - 79	73.5 - 76.5	74.25 - 75.75

NZX-series in SOD27

	V_z (V)		V_z (V)		V_z (V)
NZX2V1B	2.0 - 2.2	NZX6V2D	6.1 - 6.4	NZX14C	13.8 - 14.3
NZX2V4A	2.3 - 2.5	NZX6V2E	6.3 - 6.6	NZX15A	14.1 - 14.7
NZX2V4B	2.4 - 2.6	NZX6V8A	6.4 - 6.7	NZX15B	14.5 - 15.1
NZX2V7A	2.5 - 2.7	NZX6V8B	6.6 - 6.9	NZX15C	14.9 - 15.5
NZX2V7B	2.6 - 2.8	NZX6V8C	6.7 - 7	NZX15X	14.35 - 15.09
NZX2V7C	2.7 - 2.9	NZX6V8D	6.9 - 7.2	NZX16A	15.3 - 15.9
NZX3V0A	2.8 - 3	NZX7V5A	7 - 7.3	NZX16B	15.7 - 16.5
NZX3V0B	2.9 - 3.1	NZX7V5B	7.2 - 7.6	NZX16C	16.3 - 17.1
NZX3V0C	3 - 3.2	NZX7V5C	7.3 - 7.7	NZX18A	16.9 - 17.7
NZX3V3A	3.1 - 3.3	NZX7V5D	7.5 - 7.9	NZX18B	17.5 - 18.3
NZX3V3B	3.2 - 3.4	NZX7V5X	7.07 - 7.45	NZX18C	18.1 - 19
NZX3V3C	3.3 - 3.5	NZX8V2A	7.7 - 8.1	NZX20A	18.8 - 19.7
NZX3V6A	3.4 - 3.6	NZX8V2B	7.9 - 8.3	NZX20B	19.5 - 20.4
NZX3V6B	3.5 - 3.7	NZX8V2C	8.1 - 8.5	NZX20C	20.2 - 21.2
NZX3V6C	3.6 - 3.8	NZX8V2D	8.3 - 8.7	NZX22A	20.9 - 21.9
NZX3V9A	3.7 - 3.9	NZX9V1A	8.5 - 8.9	NZX22B	21.6 - 22.6
NZX3V9B	3.8 - 4	NZX9V1B	8.7 - 9.1	NZX22C	22.3 - 23.3
NZX3V9C	3.9 - 4.1	NZX9V1C	8.9 - 9.3	NZX24A	22.9 - 24
NZX4V3A	4 - 4.2	NZX9V1D	9.1 - 9.5	NZX24B	23.6 - 24.7
NZX4V3B	4.1 - 4.3	NZX9V1E	9.3 - 9.7	NZX24C	24.3 - 25.5
NZX4V3C	4.2 - 4.4	NZX10A	9.5 - 9.9	NZX24X	22.61 - 23.77
NZX4V3D	4.3 - 4.5	NZX10B	9.7 - 10.1	NZX27A	25.2 - 26.6
NZX4V7A	4.4 - 4.6	NZX10C	9.9 - 10.3	NZX27B	26.2 - 27.6
NZX4V7B	4.5 - 4.7	NZX10D	10.2 - 10.6	NZX27C	27.2 - 28.6
NZX4V7C	4.6 - 4.8	NZX11A	10.4 - 10.8	NZX27X	26.99 - 28.39
NZX4V7D	4.7 - 4.9	NZX11B	10.7 - 11.1	NZX30A	28.2 - 29.6
NZX5V1A	4.8 - 5	NZX11C	10.9 - 11.3	NZX30B	29.2 - 30.6
NZX5V1B	4.9 - 5.1	NZX11D	11.1 - 11.6	NZX30C	30.2 - 31.6
NZX5V1C	5 - 5.2	NZX12A	11.4 - 11.9	NZX30X	29.02 - 30.51
NZX5V1D	5.1 - 5.3	NZX12B	11.6 - 12.1	NZX33A	31.2 - 32.6
NZX5V6A	5.2 - 5.5	NZX12C	11.9 - 12.4	NZX33B	32.2 - 33.6
NZX5V6B	5.3 - 5.6	NZX12D	12.2 - 12.7	NZX33C	33.2 - 34.5
NZX5V6C	5.4 - 5.7	NZX12X	11.44 - 12.03	NZX36A	34.2 - 35.7
NZX5V6D	5.5 - 5.8	NZX13A	12.4 - 12.9	NZX36B	35.3 - 36.8
NZX5V6E	5.6 - 5.9	NZX13B	12.6 - 13.1	NZX36C	36.4 - 38
NZX6V2A	5.7 - 6	NZX13C	12.9 - 13.4	NZX36X	35.36 - 37.19
NZX6V2B	5.8 - 6.1	NZX14A	13.2 - 13.7		
NZX6V2C	6 - 6.3	NZX14B	13.5 - 14		

General-purpose, high-speed switching diodes < 90 V

V_R max (V)	V_F max (V)	@ I_F (mA)	I_R max (nA)	@ V_R (V)	t_{rr} max (ns)	Package	SOD80C (MiniMelf)	SOT23	SOT143B	SOT323 (SC-70)	SOT363 (SC-88)	DFN1006-3 (SOT883)
						Size (mm)	3.5 x 1.5 x 1.5	2.9 x 1.3 x 1.0	2.9 x 1.3 x 1.0	2.0 x 1.25 x 0.95	2.0 x 1.25 x 0.95	1.0 x 0.6 x 0.48
						P_{tot} (mW)	500	250	250	200	300	250
50	1	50	100	50	4			BAL74				
								BAV74				
70	1	50	1000	70	4			BAL99				
75	1	50	1000	75	4				BAS28			
		100	5000	75	4		BAS32L					
80	1	50	500	80	4					1PS300		
										1PS301		
										1PS302		
								BAW56		BAW56W		BAW56M
90	1	50	500	80	4						BAW56S	
											BAV756S	

General-purpose, high-speed switching diodes 100 V

V_R max (V)	V_F max (V)	@ I_F (mA)	I_R max (nA)	@ V_R (V)	t_{rr} max (ns)	Package	SOT23	SOD123F	SOT323 (SC-70)	SOT363 (SC-88)	SOD323 (SC-76)	SOD323F (SC-90)	SOT666	SOD523 (SC-79)	DFN1006-2 (SOD882)	DFN1006-3 (SOT883)	DFN1006D-2 (SOD882D)
						Size (mm)	2.9 x 1.3 x 1.0	2.6 x 1.6 x 1.1	2.0 x 1.25 x 0.95	2.0 x 1.25 x 0.95	1.7 x 1.25 x 0.95	1.7 x 1.25 x 0.7	1.6 x 1.2 x 0.55	1.2 x 0.8 x 0.6	1.0 x 0.6 x 0.48	1.0 x 0.6 x 0.48	1.0 x 0.6 x 0.37
						P_{tot} (mW)	250	830	200	300	400	550	180	500	250	250	250
100	1	50	500	80	4			BAS16H			BAS316	BAS16J		BAS516	BAS16L		BAS16LD
							BAS16		BAS16W								
										BAS16VY			BAS16VV				
							BAV70		BAV70W							BAV70M	
										BAV70S							
							BAV99		BAV99W								
										BAV99S							

General-purpose switching diodes ≥ 100 V

V_R max (V)	V_F max (V)	@ I_F (mA)	I_R max (nA)	@ V_R (V)	t_{rr} max (ns)	Package	SOD80C (MiniMelf)	SOT457 (SC-74)	SOT23	SOT143B	SOD123F	SOT323 (SC-70)	SOT363 (SC-88)	SOD323 (SC-76)	SOD323F (SC-90)	SOD523 (SC-79)
						Size (mm)	3.5 x 1.5 x 1.5	2.9 x 1.5 x 1.0	2.9 x 1.3 x 1.0	2.9 x 1.3 x 1.0	2.6 x 1.6 x 1.1	2.0 x 1.25 x 0.95	2.0 x 1.25 x 0.95	1.7 x 1.25 x 0.95	1.7 x 1.25 x 0.7	1.2 x 0.8 x 0.6
						P_{tot} (mW)	300	500	250	250	830	350	300	400	550	500
100	1	100	100	100	50				BAS19							
150	1	100	100	150	50		BAV102									
									BAS20							
≥200	1	100	100	150	50		BAV103				BAS21H			BAS321		
				200					BAS21			BAS21W				
										BAV23						
									BAV23A			BAS21AW				
									BAV23C							
									BAV23S			BAS21SW				
									BAS21AVD							
									BAS21VD							
300	1.1	100	150	250	50										BAS21J	BAS521
									BAS101							
									BAS101S							
										BAW101						
													BAW101S			

PN-rectifier

V_R max (V)	V_F max (V)	(@) I_F (A)	IR max (µA)	(@) V_R (V)	trr max (ns)	Package	SOD123W
						Size (mm)	2.6 x 1.7 x 1.0
						P_{tot} (mW)	950
400	1.1	1	1	400	1800		PNS40010ER

Controlled-avalanche switching diodes

V_R max (V)	V_F max (V)	@ I_F (mA)	I_R max (nA) @ V_R max	I_{FSM} max (A)	I_{FRM} max (mA)	C_d max (pF)	t_r max (ns)	Package	SOT23	SOT143B
								Size (mm)	2.9 x 1.3 x 1.0	2.9 x 1.3 x 1.0
								P_{tot} (mW)	250	250
60	1	200	100	9	600	2.5	6			BAS56
90	1	200	100	10	600	35	50		BAS29	
									BAS31	
									BAS35	

Low-leakage current-switching

V_R max (V)	V_F max (V)	@ I_F (mA)	I_R max (nA) @ V_R max	t_{rr} max (µs)	Package	SOD80C (MiniMelf)	SOD68 (DO-34)	SOT23	SOD123F	SOT323 (SC-70)	SOD323 (SC-76)	SOD523 (SC-79)
					Size (mm)	3.5 x 1.5 x 1.5	3.04 x 1.6 x 0.55	2.9 x 1.3 x 1.0	2.6 x 1.6 x 1.1	2.0 x 1.25 x 0.95	1.7 x 1.25 x 0.95	1.2 x 0.8 x 0.6
					P_{tot} (mW)	300	500	250	830	250	400	500
75	1	10	5	3					BAS116H		BAS416	BAS716
								BAS116				
								BAV199		BAV199W		
								BAW156				
								BAV170				
125	1	100	1	1.5 typ		BAS45AL	BAS45A					

Hyperfast power diodes

types in **bold** represent new products

	V_{RRM} (V)	$I_{F(AV)}$ (A)	V_F (typ) @ 150C (V)	@ I_F (A)	t_{rr} (typ) @ 25C (ns)	SOD59 (TO220AC)	SOD113 (2-pin SOT186A)	SOD142 (2-pin TO247)	SOT429 (3-pin TO247)	SOT78 (TO220AB)	SOT404 (D^2PAK)
Hyperfast diodes for **C**ontinuous **C**urrent **M**ode PFC	500	5	1.15	5	16	BYC5D-500	BYC5DX-500				
			1.4		19	BYC5-600	BYC5X-600				BYC5B-600
					13	**BYC5-600P**	**BYC5X-600P**				
	600	8	1.4	8	19	BYC8-600	BYC8X-600				BYC8B-600
					20	BYC8D-600	BYC8DX-600				
					19	BYC8-600P	BYC8X-600P				BYC8B-600P
		10	1.3	10		BYC10-600	BYC10X-600				BYC10B-600
						BYC10-600P	BYC10X-600P				
					18	BYC10D-600	BYC10DX-600				
		2 x 5	1.4	5	19					BYC10-600CT	
		15		15		BYC15-600	BYC15X-600				
					22	BYC15-600P	BYC15X-600P				
		20	1.2	20	19	BYC20-600	BYC20X-600				
					26	BYC20D-600P	BYC20DX-600P				
					25		BYC20X-600P				
		30	1.4	30	29		BYC30X-600P	BYC30W-600P	BYC30WT-600P		

In the spotlight

Hyperfast recovery power diodes

- Comprehensive package offerings
- Low leakage current (platinum doped series)
- Low reverse recovery current
- Low thermal resistance
- Reduces switching losses in associated MOSFET or IGBT

Power Schottky diodes

	V_{RRM} (V)	$I_{F(AV)}$ (A)	V_F (typ) @ 125C (V)	@ I_F (A)	SOT78 (TO220AB)	SOT186A (isolated TO220AB)
Power Schottky diodes for SMPS output rectification	100	2 x 10	0.59	10	NXPS20H100C	NXPS20H100CX
			0.62	10	NXPS20S100C	NXPS20S100CX
			0.59	10	NXPS20H110C	

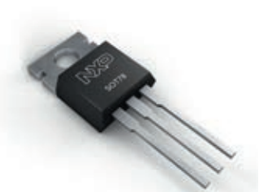
Casco diodes

	V_{RRM} (V)	$I_{F(AV)}$ (A)	V_F (typ) @ 150C (V)	@ I_F (A)	t_{rr} (typ) @ 25C (ns)	SOD113 (2-pin SOT186A)
Casco diodes for Continuous Current Mode PFC	600	8	2	8	12.5	BYC58X-600

In the spotlight

Power Schottky diodes

- Negligible switching losses
- High junction temperature capability
- Low leakage current
- Optimized design to give low V_F and high Tjmax
- Integrated guard ring for voltage stress protection

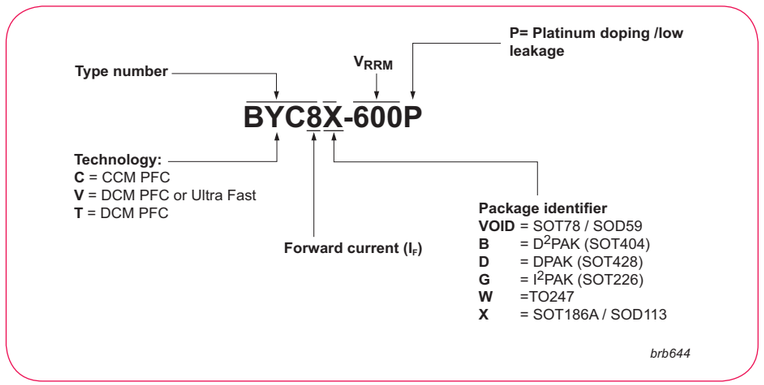


Ultrafast power diodes

types in **bold** represent new products
Types in ***bold italic underlined*** represent products in development

	V_{RRM} (V)	$I_{F(AV)}$ (A)	V_F (typ) @150C (V)	@ I_F (A)	t_{rr} (typ) @25C (ns)	SOD59 (TO220AC)	SOD113 (2-pin SOT186A)	SOD141 (DO201AD)	SOD142 (2-pin TO247)	SOT78 (TO220AB)		SOT186A (isolated TO220AB)	SOT223	SOT226 (I²PAK)	SOT404 (D²PAK)	SOT428 (DPAK)	SOD132 (SMB)	SOT1259 (TO-3P)	SOT429 (TO247)
	100	8	0.8	8	20	BYW29E-100													
		2 x 10	0.72							BYV32E-100									
	150	2 x 0.75	0.5	0.5	10								BYV40E-150						
		8	0.8	8	20	BYW29E-150													
		2 x 10	0.72							BYV32E-150									
		2 x 15	0.78	15						BYV42E-150									
	200	8	0.8	8	20	BYW29E-200	BYW29EX-200									BYW29ED-200			
		2 x 5		5	15					BYQ28E-200		BYQ28X-200				BYQ28ED-200			
										BYQ28E-200E									
		14	0.83	14	20	BYV79E-200													
		2 x 8	0.84	8						BYQ30E-200									
		2 x 10	0.72							BYV32E-200				BYV32G-200	BYV32EB-200				
		2 x 15	0.78	15						BYV42E-200				BYV42G-200	BYV42EB-200				BYV72EW-200
	300	2 x 5	0.95	5	50					BYT28-300									
	400	9	0.9	8		BYV29-400													
		2 x 10	0.87	10						BYV34-400									
		2 x 15	0.95	15	35														BYV74W-400
Ultrafast diodes for **D**iscontinuous **C**urrent Mode or Critical **C**onduction **M**ode PFC	500	9	0.9	8	50	BYV29-500	BYV29X-500								BYV29B-500				
	600	2 x 5	0.95	5						BYT28-500									
		15	0.9	15		BYT79-500													
		2 x 10	0.87	10						BYV34-500									
		2 x 15	0.95	15						BYV44-500									
		4	0.82	3	35			NUR460P											
		5	0.97	5	50		BYV25X-600							BYV25G-600		BYV25D-600			
		8	1.07	8	60	BYR29-600	BYR29X-600												
		9	0.97			BYV29-600	BYV29X-600							BYV29G-600	BYV29B-600				
		15	1	15	50	BYT79-600	BYT79X-600												
		2 x 10	0.92	10						BYV34-600		BYV34X-600		BYV34G-600					
		5	1.1	5	17.5	BYV25F-600	BYV25FX-600								BYV25FB-600	BYV25FD-600			
Enhanced ultrafast diodes for interleaved PFC and dual-mode DCM/CCM	600	9	1.25	8	17.5	BYV29F-600	BYV29FX-600								BYV29FB-600	BYV29FD-600			
		10		10	20	BYV10-600P	BYV10X-600P												
					21		**BYV10EX-600P**									***BYV10ED-600P***			
		2 x 10	1.3		20					BYV410-600		BYV410X-600							
		2 x 15	1.1		25													**BYV415K-600P**	BYV415W-600P
	800	8	1.07	8	60	BYR29-800	BYR29X-800												
	1200	16	1.65	16	80				BYR16W-1200										

Power diode part numbering



In the spotlight

Ultrafast recovery power diodes

- Fast switching
- High voltage capability
- Low forward voltage drop
- Low leakage current (platinum doped series)
- Low thermal resistance
- Soft recovery characteristic

ESD protection, filtering and signal conditioning

Safeguard your SoC – upgrade to the 6th generation of ESD protection devices

The best system-chip protection available in the market

- Extremely deep snap-back
- Low dynamic resistance of ±0.27 Ω
- Extremely low diode switching times

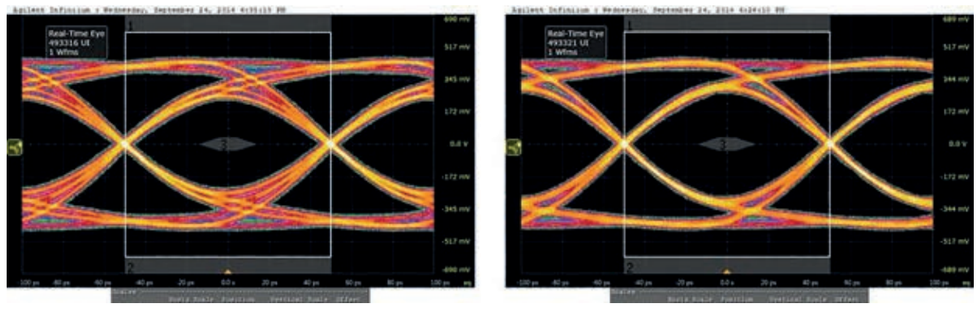
Extremely low clamping voltage
Absorbing highest ESD pulses
THE key for reliable system protection

- Low capacitance of 0.3 pF unidirectional, fully supporting SuperSpeed USB 10 Gbps
- Flexible package options: Choose small, RF-optimized DFN2510A-10 / DFN2111-7 or tiny DSN0603 (0201 inch) form factor

NXP's 6th generation of ESD protection devices

The solution for future-proof designs in computing and mobile applications

PUSB3FR4: USB3.1 eye diagram @ 10 Gbps



PUSB3FR4 on standard FR4 testboard

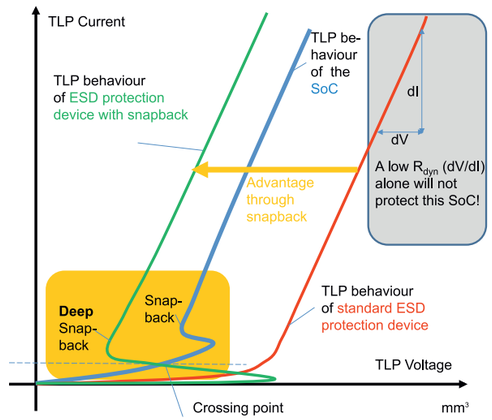
Standard FR4 testboard without ESD protection

PUSB3FR4 is ready for the new SuperSpeed USB 10 Gbps standard

6th generation ESD protection devices – selection guide

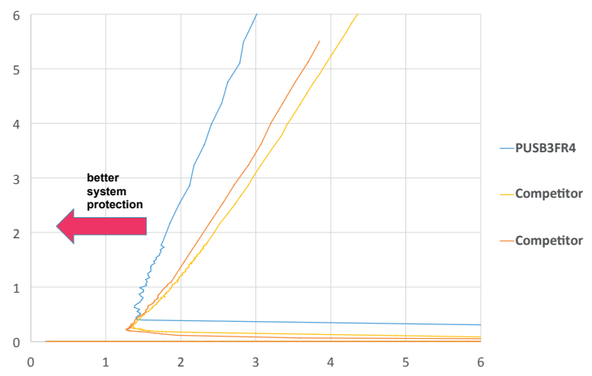
Type	V_{RWM} (V)	Uni- or bidirectional	C_{line} typ (pF)	ESD rating max (kV)	R_{dyn} TLP (Ω)	Number of protected lines	Package	Size (mm)
PUSB3FR4	5	uni	0.29	15	0.27	4 lines	DFN2510A-10	2.5 x 1.0 x 0.48
PUSB3FR6	5	uni	0.29	15	0.27	6 lines	DFN2111-7	2.1 x 1.1 x 0.48
PESD5V0R1BSF	5	bi	0.18	10	0.5	1 line	DSN0603	0.6 x 0.3 x 0.3
PESD5V0H1BSF	5	bi	0.22	15	0.36	1 line	DSN0603	0.6 x 0.3 x 0.3
PESD5V0C1BSF	5	bi	0.26	20	0.35	1 line	DSN0603	0.6 x 0.3 x 0.3
PESD5V0C1USF	5	uni	0.35	20	0.18	1 line	DSN0603	0.6 x 0.3 x 0.3

How to achieve the best SOC protection



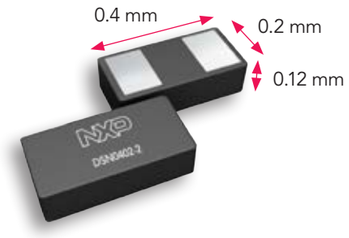
- Sensitive SoCs react quickly to transients (ESD pulses and TLP measurements)
- Standard protection devices react at higher TLP voltages and do not offer sufficient protection
- Devices with deep snapback protect the most sensitive SoCs against ESD pulses according to IEC61000-4-2

PUSB3FR4: Transmission Line Pulse (TLP) measurement



The PUSB3FR4 absorbs the most pulse energy and safeguards the SoC. The same SoC was damaged at half the IEC voltage using competitor products.

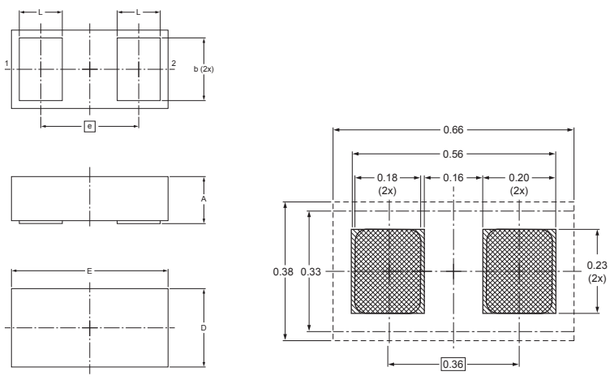
Tiny but mighty – DSN0402
Reliable ESD protection on minimal space



DSN0402-2 (SOD992) features and benefits

- Ultra-small dimensions: 0.4 x 0.2 mm (02001 inch)
- 45% less package area compared to DSN0603-2
- Only 120 µm in height
- Coated sidewalls enable easier soldering
- Polarity marking
- Halogen and antimony free; RoHS compliant

DSN0402-2 package outline and reflow soldering footprint



Dimensions (mm are the original dimensions)

Unit		A	E	D	L	b	e
mm	max	0.14	0.42	0.22	0.12	0.17	
	nom	0.12	0.40	0.20	0.11	0.16	0.25
	min	0.10	0.38	0.18	0.10	0.15	

Reliable ESD protection for all interfaces and applications

- Uni- and bidirectional configuration
- Standard and ultra-low capacitances down to 0.25 pF
- High ESD robustness up to 25 kV
- Ultra-low leakage currents

Standard capacitance

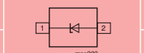
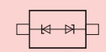
Type	V_{rwm}	Config	C_d typ	C_d max	V_{esd}	I_{rm} typ	I_{rm} max
PESD5V0V1BSH	5 V	Bi	5 pF	6 pF	25 kV	1 nA	25 nA
PESD5V0V1USH	5 V	Uni	10 pF	12 pF	20 kV	1 nA	100 nA

Ultra-low capacitance

Type	V_{rwm}	Config	C_d typ	C_d max	V_{esd}
PESD5V0F1BSH	5 V	Bi	0.25 pF	0.3 pF	8 kV
PESD5V0F1USH	5 V	Uni	0.4 pF	0.6 pF	8 kV

Ultra low-capacitance ESD protection devices – Part 1

types in **bold** represent new products

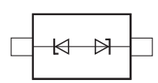
Number of protected lines: Unidirectional	Number of protected lines: Bidirectional	V_{RWM} (V)	C_{line} typ (pF)	C_{line} max (pF)	ESD rating [1] max (kV)	Configuration	Type	Package	Size (mm)
1	0	5	0.4	0.6	8		**PESD5V0F1USH**	DSN0402-2 (SOD992)	0.4 x 0.2 x 0.12
		5	0.35	0.41	20		**PESD5V0C1USF**	DSN0603-2 (SOD962) 	0.6 x 0.3 x 0.3
		5.5	0.45	0.6	10		**PESD5V0F1USF**		
		5	0.95	1.15	8		PESD5V0X1ULD	DFN1006D-2 (SOD882D) 	1.0 x 0.6 x 0.37
			1.55	1.75	15		PESD5V0X1UALD		
		16	0.83	0.98	8		PESD16VX1UL	DFN1006-2 (SOD882) 	1.0 x 0.6 x 0.48
		5	0.95	1.15	8		PESD5V0X1UB	SOD523 (SC-79) 	1.2 x 0.8 x 0.6
			1.55	1.75	15		PESD5V0X1UAB		
		80	0.6	0.75	30		NUP1301U	SOT323 	2.0 x 1.25 x 0.95
							NUP1301	SOT23 	2.9 x 1.3 x 1.0
		5.5	1	1.5	8		PRTR5V0U1T		
0	1	5	0.3	0.4	8		**PESD5V0F1BSH**	DSN0402-2 (SOD992)	0.4 x 0.2 x 0.12
			0.18	0.24	10		**PESD5V0R1BSF**	DSN0603-2 (SOD962) 	0.6 x 0.3 x 0.3
			0.22	0.27	15		**PESD5V0H1BSF**		
			0.26	0.32	20		**PESD5V0C1BSF**		
		5.5	0.25	0.3	10		PESD5V0F1BSF		
							PESD5V0F1BRSF		
		18	0.28	0.45			**PESD18VF1BSF**		
		24	0.25	0.4			**PESD24VF1BSF**		
		5	0.4	0.55	10		PESD5V0F1BLD	DFN1006D-2 (SOD882D) 	1.0 x 0.6 x 0.37
							PESD5V0F1BRLD	DSN0603-2 (SOD962) 	1.0 x 0.6 x 0.37
		3.3	1.3	1.6	9		PESD3V3X1BL	DFN1006-2 (SOD882) 	1.0 x 0.6 x 0.48
		5.5	0.4	0.55	10		PESD5V0F1BL		
		5	0.49	0.6	8		PESD5V0X1BCL		
			0.85	0.95	15		PESD5V0X1BCAL		
			0.9	1.3	9		PESD5V0X1BL		
		18	0.35	0.5	10		PESD18VF1BL		
		24	0.3	0.45	10		PESD24VF1BL		

[1] according to IEC 61000-4-2 (contact discharge)

In the spotlight

Ultra low-capacitance ESD protection in DSN0603-2: PESD5V0H1BSF

- Bidirectional protection for one data line in DSN0603-2
- Ultra-low line capacitance of 0.22 pF
- Ultra-low clamping
- Minimized capacitance variation over voltage
- High ESD robustness = 15 kV
- Ultra-small package DSN0603-2 (0.6 x 0.3 x 0.3 mm)



Ultra low-capacitance ESD protection devices – Part 2

types in **bold** represent new products

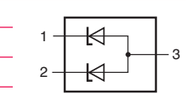
Number of protected lines		V_{RWM} (V)	C_{line} typ (pF)	C_{line} max (pF)	ESD rating [1] max (kV)	Configuration	Type	Package	Size (mm)
Unidirectional	Bidirectional								
	1	5	0.55	0.7	10		**PESD5V0X2UMB**	DFN1006B-3 (SOT883B) 	1.0 x 0.6 x 0.37
							PESD5V0X2UM	DFN1006-3 (SOT883) 	1.0 x 0.6 x 0.48
			0.85	1.1	15		**PESD5V0X2UAMB**	DFN1006B-3 (SOT883B) 	1.0 x 0.6 x 0.37
							PESD5V0X2UAM	DFN1006-3 (SOT883) 	1.0 x 0.6 x 0.48
			0.9	1.3	9		PESD5V0X1BQ	SOT663 	1.6 x 1.2 x 0.55
							PESD5V0X1BT	SOT23 	2.9 x 1.3 x 1.0
2			1	1.5	8		PRTR5V0U2X	SOT143B	2.9 x 1.3 x 1.0
			1.8	-	12		PRTR5V0U2AX		
			1	1.5	8		PRTR5V0U2F	DFN1410-6 (SOT886) 	1.45 x 1.0 x 0.48
	0	5.5	2	-	15		IP4234CZ6	SOT457 (SC-74) 	2.9 x 1.5 x 1.0
			0.7		8		IP4282CZ6	DFN1410-6 (SOT886) 	1.45 x 1.0 x 0.48
			1.3		15		IP4359CX4/LF	WLCSP4 	0.76 x 0.76 x 0.61
			0.8	1.0	8		IP4369CX4		0.76 x 0.76 x 0.47

[1] according to IEC 61000-4-5 (contact discharge)

In the spotlight

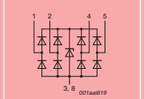
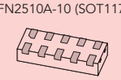
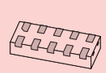
Lowest capacitance ESD protection in DFN1006B-3: PESD5V0X2UAMB

- Unidirectional double protection for two signal lines
- Ultra-low line capacitance of 0.8 pF
- Very low package height of 0.37 mm typ
- High ESD robustness of 15 kV
- AEC-Q101 qualified
- Ideal for high-speed data lines, portable electronics, and communication systems



Ultra low-capacitance ESD protection devices – Part 3

types in **bold** represent new products

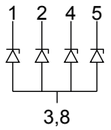
Number of protected lines		V_{RWM} (V)	C_{line} typ (pF)	C_{line} max (pF)	ESD rating [1] max (kV)	Configuration	Type	Package	Size (mm)
Unidirectional	Bidirectional								
4	0	5.5	1	-	8		IP4220CZ6	SOT457 (SC-74) 	2.9 x 1.5 x 1.0
							IP4221CZ6-S	DFN1410-6 (SOT886) 	1.45 x 1.0 x 0.48
							**IP4221CZ6-XS**	DFN1010-6 (SOT891) 	1.0 x 1.0 x 0.48
							**IP4233CZ6**	SOT363 (SC-88) 	2.0 x 1.25 x 0.95
							PRTR5V0U4D	SOT457 (SC-74) 	2.9 x 1.5 x 1.0
							PRTR5V0U4Y	SOT363 (SC-88) 	2.0 x 1.25 x 0.95
			0.8	-	12		IP4285CZ9-TBB	DFN2110-9 (SOT1178) 	2.1 x 1.0 x 0.48
							PUSB2X4D	SOT457 (SC-74) 	2.9 x 1.5 x 1.0
							PUSB2X4Y	SOT363 (SC-88) 	2.0 x 1.25 x 0.95
			0.6	-	8		IP4283CZ10-TBR	DFN2510A-10 (SOT1176) 	2.5 x 1.0 x 0.48
			0.5	-	8		IP4284CZ10-TBR	DFN2510A-10 (SOT1176) 	2.5 x 1.0 x 0.48

[1] according to IEC 61000-4-5 (contact discharge)

In the spotlight

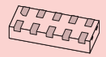
PUSB3FR4 - ESD protection in very small DFN2510A-10 package for USB3.0

- Protects four very fast data lines of sensitive system chips
- Best system chip protection in the 0.3 pF class
- Very small DFN2510A-10 package (2.5 x 1.0 x 0.48 mm)
- Capacitance < 0.3 pF



Ultra low-capacitance ESD protection devices – Part 4

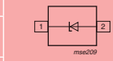
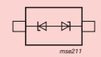
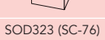
types in **bold** represent new products

Number of protected lines		V_{RWM} (V)	C_{line} typ (pF)	C_{line} max (pF)	ESD rating [1] max (kV)	I_R max (µA) @ V_{RWM}	Configuration	Type	Package	Size (mm)
Unidirectional	Bidirectional									
4	0	5.5	0.55	-	8	-		IP4292CZ10-TBR	DFN2510A-10 (SOT1176) 	2.5 x 1.0 x 0.48
			0.5	-	10			IP4294CZ10-TBR		
		3.3	0.27	-	15	0.1		**PUSB3FR4**		2.5 x 1.0 x 0.48
5	4	5	0.5	0.65	8	0.1		PESD5V0F5UF	DFN1410-6 (SOT886) 	1.45 x 1.0 x 0.48
								PESD5V0F5UV	SOT666 	1.6 x 1.2 x 0.55
0	6	5.5	0.27	0.35	10	0.1		**PUSB3TB6**	DFN2111-7 (SOT1358) 	2.1 x 1.1 x 0.48
6	0	3.3	0.25	-	15	0.1		**PUSB3FR6**		

[1] according to IEC 61000-4-2 (contact discharge)

Low-capacitance ESD protection devices – Part 1

types in **bold** represent new products

Number of protected lines		V_{RWM} (V)	C_{line} typ (pF)	C_{line} max (pF)	P_{PP} [1] max (W)	ESD rating [2] max (kV)	I_R max (µA) @ V_{RWM}	Configuration	Type	Package	Size (mm)
Unidirectional	Bidirectional										
1	0	5	10	12	-	20	100		**PESD5V0V1USH**	DSN0402-2 (SOD992) 	0.4 x 0.2 x 0.12
		3.3	34	40	45	30	0.3		PESD3V3L1UL	DFN1006-2 (SOD882) 	1.0 x 0.6 x 0.48
		5	25	30	42	26	0.1		PESD5V0L1UL		
		5	25	30	42	26	0.1		PESD5V0L1ULD	DFN1006D-2 (SOD882D) 	1.0 x 0.6 x 0.37
		5	25	30	42	26	0.1		PESD5V0L1UB	SOD523 (SC-79) 	1.2 x 0.8 x 0.6
		3.3	34	40	45	30	0.3		PESD3V3L1UA	SOD323 (SC-76) 	1.7 x 1.25 x 0.95
		5	25	30	42	26	0.1		PESD5V0L1UA		
		5	12	15	10	30	0.1		PESD5V0L1USF	DSN0603-2 (SOD962) 	0.6 x 0.3 x 0.3
		5	4	5	8	14	0.1		PESD5V0V1USF		
		3.3	2.6	3.1	-	9	0.1 (@ 3 V)		PESD3V3U1UL	DFN1006-2 (SOD882) 	1.0 x 0.6 x 0.48
		5	2	2.6	-	9	0.1		PESD5V0U1UL		
		3.3	2.6	3.1	-	9	0.1 (@ 3 V)		PESD3V3U1UB	SOD523 (SC-79) 	1.2 x 0.8 x 0.6
		5	2	2.6	-	9	0.1		PESD5V0U1UB		
		3.3	2.6	3.1	-	9	0.1 (@ 3 V)		PESD3V3U1UA	SOD323 (SC-76) 	1.7 x 1.25 x 0.95
		5	2	2.6	-	9	0.1		PESD5V0U1UA		
0	1	5.5	12	15.4	35	30	0.1		PESD5V0L1BSF	DSN0603-2 (SOD962) 	0.6 x 0.3 x 0.3
		3.3	101	-	500	30	2		PESD3V3L1BA	SOD323 (SC-76)	1.7 x 1.25 x 0.95
		5	75	-	500	30	1		PESD5V0L1BA		
		12	19	-	200	30	0.05		PESD12VL1BA	SOD323 (SC-76) 	1.7 x 1.25 x 0.95
		15	16	-	200	30	0.05		PESD15VL1BA		
		24	11	-	200	23	0.05		PESD24VL1BA		

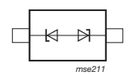
[1] 8 / 20 µs exponential decay waveform according to IEC 61000-4-5 and IEC 61643-321

[2] according to IEC 61000-4-2 (contact discharge)

In the spotlight

PESD5V0V1BSH – ESD protection in super small DNS0402-2 package

- Super small 0.4 x 0.2 CSP package
- Only 120 µm package height
- ESD protection of one 5V line
- Up to 20 kV ESD robustness



ESD protection, filtering and signal conditioning

Low-capacitance ESD protection devices – Part 2

types in **bold** represent new products

Number of protected lines		V_{RWM} (V)	C_{line} typ (pF)	C_{line} max (pF)	P_{pp} [1] max (W)	ESD rating [2] max (kV)	I_R max (µA) @ V_{RWM}	Configuration	Type	Package	Size (mm)
Unidirectional	Bidirectional										
0	1	5	5	7	35	25	25		**PESD5V0V1BSH**	DSN0402-2 (SOD992)	0.4 x 0.2 x 0.12
		5	11	13	45	30	0.01		PESD5V0V1BL	DFN1006-2 (SOD882) 	1.0 x 0.6 x 0.48
		5	11	13	45	30	0.01		PESD5V0V1BLD	DFN1006D-2 (SOD882D) 	1.0 x 0.6 x 0.37
		5	11	13	45	30	0.01		PESD5V0V1BB	SOD523 (SC-79) 	1.2 x 0.8 x 0.6
		5	11	13	45	30	0.01		PESD5V0V1BA	SOD323 (SC-76) 	1.7 x 1.25 x 0.95
		5	5.3	6	10	20	0.1		PESD5V0V1BCSF	DSN0603-2 (SOD962) 	0.6 x 0.3 x 0.3
		5	5.3	6	20	25	0.1		PESD5V0V1BDSF		
		5.5	3.5	4.5	8	15	0.1		PESD5V0V1BSF		
		12	17	25	290	30	0.01		**PESD12VV1BL**	DFN1006-2 (SOD882) 	1.0 x 0.6 x 0.48
		15	8	10	-	15	0.1		IP4302CX2/A	WLCSP2 	0.7 x 0.52 x 0.40
		5	2.9	3.5	-	10	0.1		PESD5V0U1BL	DFN1006-2 (SOD882) 	1.0 x 0.6 x 0.48
									PESD5V0U1BLD	DFN1006D-2 (SOD882D) 	1.0 x 0.6 x 0.37
									PESD5V0U1BB	SOD523 (SC-79) 	1.2 x 0.8 x 0.6
									PESD5V0U1BA	SOD323 (SC-76) 	1.7 x 1.25 x 0.95
2	1	3.3	22	28	30	15	0.3		PESD3V3L2UM	DFN1006-3 (SOT883) 	1.0 x 0.6 x 0.48
		5	16	19	30	15	0.025		PESD5V0L2UM		
					-	15	0.025		PESD5V0L2UMB	DFN1006B-3 (SOT883B) 	1.0 x 0.6 x 0.37
			38	46	70	30	0.09 (@ 4 V)		PESD5V0L2UU	SOT323 (SC-70) 	2.0 x 1.25 x 0.95
		6	34	40	60	30	0.018 (@ 4.3 V)		PESD6V0L2UU		

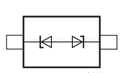
[1] 8 / 20 µs exponential decay waveform according to IEC 61000-4-5 and IEC 61643-321

[2] according to IEC 61000-4-5 (contact discharge)

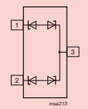
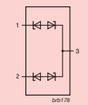
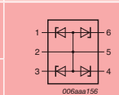
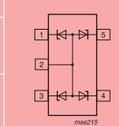
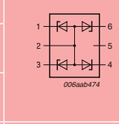
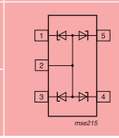
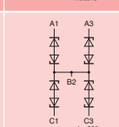
In the spotlight

PESD12VV1BL: Lowest capacitance ESD protection in DSN1006-2

- Bidirectional protection for one data line
- Very low line capacitance of 17 pF
- High ESD robustness of 30 kV
- AEC-Q101 qualified
- Ultra-small package DFN1006-2 (SOD993) with a height of only 0.48 mm typ
- Ideal for portable electronics, communication systems, or audio and video equipment



Low-capacitance ESD protection devices – Part 3

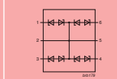
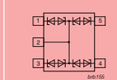
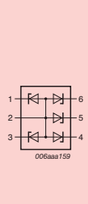
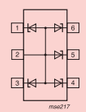
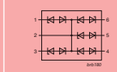
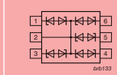
Number of protected lines		V_{RWM} (V)	C_{line} typ (pF)	C_{line} max (pF)	P_{pp} [1] max (W)	ESD rating [2] max (kV)	I_R max (µA) @ V_{RWM}	Configuration	Type	Package	Size (mm)
Unidirectional	Bidirectional										
0	2	3.3	101	-	350	30	2		PESD3V3L2BT	SOT23 	2.9 x 1.3 x 1.0
		5	75			30	1		PESD5V0L2BT		
		12	19		200	30	0.05		PESD12VL2BT		
		15	16			30	0.05		PESD15VL2BT		
		24	11			23	0.05		PESD24VL2BT		
		5	35	45	130	30	0.1		PESD5V0S2BT		
			2.9	3.5	-	10	0.1		PESD5V0U2BT		
					-				PESD5V0U2BM	DFN1006-3 (SOT883) 	1.0 x 0.6 x 0.48
					-				PESD5V0U2BMB	DFN1006B-3 (SOT883B) 	1.0 x 0.6 x 0.37
		15	13	15	-	15	0.1		IP4303CX4/P	WLCSP4 	0.76 x 0.76 x 0.40
4	3	3.3	22	28	30	20	0.3		PESD3V3L4UF	DFN1410-6 (SOT886) 	1.45 x 1.0 x 0.48
		5	16	19	30	20	0.025		PESD5V0L4UF		
		3.3	22	28	30	20	0.3		PESD3V3L4UW	SOT665 	1.6 x 1.2 x 0.55
		5	16	19	30	20	0.025		PESD5V0L4UW		
		3.3	22	28	30	20	0.3		PESD3V3L4UG	SOT353 (SC-88A) 	2.0 x 1.25 x 0.95
		5	16	19	30	20	0.025		PESD5V0L4UG		
		3.3	13	17	25	10	1		PESD3V3V4UK	DFN1010-6 (SOT891) 	1.0 x 1.0 x 0.48
		5	12	15	25	15	0.3		PESD5V0V4UK		
		9	6.5	10	28	8	0.1		PESD9V0V4UK		
		3.3	15	18	16	12	0.3		PESD3V3V4UW	SOT665 	1.6 x 1.2 x 0.55
		5	12	15	16	12	0.025		PESD5V0V4UW		
0	4	5.5	18	20	-	15	0.1		IP4343CX5/LF	WLCSP5 	1.06 x 0.76 x 0.61

[1] 8 / 20 µs exponential decay waveform according to IEC 61000-4-5 and IEC 61643-321

[2] according to IEC 61000-4-5 (contact discharge)

ESD protection, filtering and signal conditioning

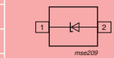
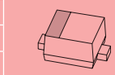
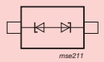
Low-capacitance ESD protection devices – Part 4

Number of protected lines		V_{RWM} (V)	C_{line} typ (pF)	C_{line} max (pF)	P_{pp} [1] max (W)	ESD rating [2] max (kV)	I_R max (µA) @ V_{RWM}	Configuration	Type	Package	Size (mm)
Unidirectional	Bidirectional										
0	4	5	2.9	3.5	-	10	0.1		PESD5V0U4BF	DFN1410-6 (SOT886) 	1.45 x 1.0 x 0.48
		5	2.9	3.5	-	10	0.1		PESD5V0U4BW	SOT665 	1.6 x 1.2 x 0.55
5	4	3.3	20	24	28	15	2		PESD3V3L5UK	DFN1010-6 (SOT891) 	1.0 x 1.0 x 0.48
		5	18.5	22	30	20	0.5		PESD5V0L5UK		
		3.3	22	28	25	20	0.3		PESD3V3L5UF	DFN1410-6 (SOT886) 	1.45 x 1.0 x 0.48
		5	16	19	25	20	0.025		PESD5V0L5UF		
		3.3	22	28	25	20	0.3		PESD3V3L5UV	SOT666 	1.6 x 1.2 x 0.55
		5	16	19	25	20	0.025		PESD5V0L5UV		
		3.3	22	28	25	20	0.3		PESD3V3L5UY	SOT363 (SC-88) 	2.0 x 1.25 x 0.95
		5	16	19	25	20	0.025		PESD5V0L5UY		
0	5	5	2.9	3.5	-	10	0.1		PESD5V0U5BF	DFN1410-6 (SOT886) 	1.45 x 1.0 x 0.48
		5	2.9	3.5	-	10	0.1		PESD5V0U5BV	SOT666 	1.6 x 1.2 x 0.55

[1] 8 / 20 µs exponential decay waveform according to IEC 61000-4-5 and IEC 61643-321

[2] according to IEC 61000-4-5 (contact discharge)

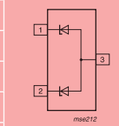
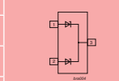
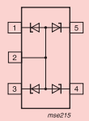
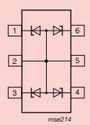
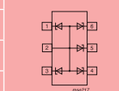
Standard ESD protection devices – Part 1

Number of protected lines		V_{RWM} (V)	C_{line} typ (pF)	C_{line} max (pF)	P_{pp} [1] max (W)	ESD rating [2] max (kV)	I_R max (µA) @ V_{RWM}	Configuration	Type	Package	Size (mm)
Unidirectional	Bidirectional										
1	0	5	35	42	40	30	0.1		PESD5V0S1USF	DSN0603-2 (SOD962) 	0.6 x 0.3 x 0.3
		3.3	207	300	150	30	2		PESD3V3S1UL	DFN1006-2 (SOD882) 	1.0 x 0.6 x 0.48
		5	152	200	150	30	1		PESD5V0S1UL		
		12	38	75	150	30	0.05		PESD12VS1UL		
		15	32	70	150	30	0.05		PESD15VS1UL		
		24	23	50	150	23	0.05		PESD24VS1UL		
		36	18	30	150	30	0.01		PESD36VS1UL		
		5	152	200	150	30	1		PESD5V0S1ULD	DFN1006D-2 (SOD882D) 	1.0 x 0.6 x 0.37
		12	38	75	150	30	0.05		PESD12VS1ULD		
		15	32	70	150	30	0.05		PESD15VS1ULD		
		24	23	50	150	23	0.05		PESD24VS1ULD		
		3.3	207	300	330	30	2		PESD3V3S1UB	SOD523 (SC-79) 	1.2 x 0.8 x 0.6
		5	152	200	260	30	1		PESD5V0S1UB		
		12	38	75	180	30	0.05		PESD12VS1UB		
		15	32	70	160	30	0.05		PESD15VS1UB		
		24	23	50	160	23	0.05		PESD24VS1UB		
		5	480	530	890	30	4		PESD5V0S1UA	SOD323 (SC-76) 	1.7 x 1.25 x 0.95
		12	160	180	600	30	0.1		PESD12VS1UA		
		24	23	50	160	23	0.05		PESD24VS1UA		
		5	480	530	890	30	4		PESD5V0S1UJ	SOD323F (SC-90) 	1.7 x 1.25 x 0.7
		12	160	180	600	30	0.1		PESD12VS1UJ		
		2.5	229	300	260	30	6		PESD5Z2.5	SOD523 (SC-79) 	1.2 x 0.8 x 0.6
		3.3	172	200	260	30	0.05		PESD5Z3.3		
		5	89	150	180	30	0.05		PESD5Z5.0		
		6	78	150	180	30	0.01		PESD5Z6.0		
		7	69	150	180	30	0.01		PESD5Z7.0		
		12	35	75	200	30	0.01		PESD5Z12		
0	1	5.5	35	45	100	30	0.1		PESD5V0S1BSF	DSN0603-2 (SOD962) 	0.6 x 0.3 x 0.3
		5	35	45	130	30	0.1		PESD5V0S1BL	DFN1006-2 (SOD882) 	1.0 x 0.6 x 0.48
		5	35	45	130	30	0.1		PESD5V0S1BLD	DFN1006D-2 (SOD882D) 	1.0 x 0.6 x 0.37
		5	35	45	130	30	0.1		PESD5V0S1BB	SOD523 (SC-79) 	1.2 x 0.8 x 0.6
		5	35	45	130	30	0.1		PESD5V0S1BA	SOD323 (SC-76) 	1.7 x 1.25 x 0.95

[1] 8 / 20 µs exponential decay waveform according to IEC 61000-4-5 and IEC 61643-321

[2] according to IEC 61000-4-2 (contact discharge)

Standard ESD protection devices – Part 2

Number of protected lines		V_{RWM} (V)	C_{line} typ (pF)	C_{line} max (pF)	P_{pp} [1] max (W)	ESD rating [2] max (kV)	I_R max (µA) @ V_{RWM}	Configuration	Type	Package	Size (mm)
Unidirectional	Bidirectional										
2	1	3.3	200	275	150	23	3		PESD3V3S2UQ	SOT663 	1.6 x 1.2 x 0.55
		5	150	215	150	30	0.3		PESD5V0S2UQ		
		12	38	100	150	30	0.03		PESD12VS2UQ		
		15	32	70	150	30	0.05		PESD15VS2UQ		
		24	23	50	150	23	0.05		PESD24VS2UQ		
		3.3	207	300	330	30	2		PESD3V3S2UT	SOT23 	2.9 x 1.3 x 1.0
		5.2	152	200	260	30	1		PESD5V2S2UT		
		12	38	75	180	30	1		PESD12VS2UT		
		15	32	70	160	30	1		PESD15VS2UT		
		24	23	50	160	23	1		PESD24VS2UT		
		36	17	35	160	30	1 (@ 30 V)		PESD36VS2UT		
		3.3	207	300	330	30	2		PESD3V3S2UAT		
		5	152	200	260	30	1		PESD5V0S2UAT		
		15	32	70	160	30	0.05		PESD15VS2UAT		
		24	23	50	160	23	0.05		PESD24VS2UAT		
		3.3	110	300	110	30	1 (@ 3 V)		PESD3V3S4UF	DFN1410-6 (SOT886) 	1.45 x 1.0 x 0.48
		5	85	220	110	30	0.1 (@ 4.3 V)		PESD5V0S4UF		
4	3	3	107	125	-	8	1		BZA956A	SOT665 	1.6 x 1.2 x 0.55
		4	90	105	-	8	0.5		BZA962A		
		4.3	78	90	-	8	0.1		BZA968A		
		3	200	240	-	8	2		BZA856A	SOT353 (SC-88A) 	2.0 x 1.25 x 0.95
		3	200	240	-	8	2		BZA456A	SOT457 (SC-74) 	2.9 x 1.5 x 1.0
		4	165	200	-	15	0.7		BZA462A		
		15	37	48	-	8	0.1		BZA420A		
		3.3	215	300	200	30	0.8		PESD3V3S4UD		
		5	165	220	200	30	0.2		PESD5V0S4UD		
		24	40	70	200	23	0.015		PESD24VS4UD		
5	4	3.3	215	300	200	30	0.8		PESD3V3S5UD		
		5	165	220	200	30	0.2		PESD5V0S5UD		
		12	73	100	200	30	0.015		PESD12VS5UD		
		15	60	90	200	30	0.015		PESD15VS5UD		
		24	45	70	200	23	0.015		PESD24VS5UD		
0	4	5	45	75	-	15	0.1		BZA408B		

[1] 8 / 20 µs exponential decay waveform according to IEC 61000-4-5 and IEC 61643-321

[2] according to IEC 61000-4-2 (contact discharge)

USB 2.0 protection and filtering

types in **bold** represent new products

Baseband interface	Number of protected lines	R_{line}	C_{line} (pF)	Remark	Type	Package	Size (mm)
USB (CSP package)	3 + 2	47 Ω / 100 Ω	10	Integrated low- capacitance SIM-Card & USB passive filter array with ESD protection	IP4365CX11/P	WLCSP11	1.16 x 1.56 x 0.61
	2	-	0.8	MHL and USB2.0 high-speed ESD-protection	IP4369CX4	WLCSP4	0.76 x 0.76 x 0.47
USB2.0 (Plastic package)	2	0.5	2	>15 kV IEC contact ESD protection with pi-filter	IP4234CZ6	SOT457 (SC-74)	2.9 x 1.5 x 1.0
			1.0	ESD protection for up to 2 ultra high-speed datalines	PRTR5V0U2X	SOT143B	2.9 x 1.3 x 1.0
			1.8	ESD protection for up to 2 ultra high-speed datalines with 12 kV ESD robustness	PRTR5V0U2AX		
			0.7	ESD protection for ultra high-speed interfaces	IP4282CZ6	DFN1410-6 (SOT886)	1.45 x 1.0 x 0.48
				ESD protection for up to 2 ultra high-speed datalines	PRTR5V0U2F	DFN1410-6 (SOT886)	1.45 x 1.0 x 0.48
	3 + 1			USB protection for USB OTG with 5.5 V Vbat protection	PUSBM5V5X4-TL	DFN1616-6 (SOT1189)	1.6 x 1.6 x 0.48
				USB protection for USB OTG with 12 V Vbat protection	PUSBM12VX4-TL		
				USB protection for USB OTG with 15 V Vbat protection	PUSBM15VX4-TL		
				USB protection for USB OTG with 30 V Vbat protection	PUSBM30VX4-TL		
	4	-	0.8	Very low clamp ESD protection for USB2.0 high-speed with 12 kV IEC ESD protection	**PUSB2X4X**	SOT363 (SC-88)	2.0 x 1.25 x 0.95
			1	Very low clamp ESD protection for USB2.0 high-speed with 12 kV IEC ESD protection	**PUSB2X4D**	SOT457 (SC-74)	2.9 x 1.5 x 1.0
				Dual ESD protection for USB2.0 high-speed, SD-card, SIM card	IP4220CZ6		
				Dual ESD protection for USB2.0 high-speed, SD-card, SIM card	PRTR5V0U4D		
				Dual ESP protection for USB2.0 high-speed, SD-card, SIM card	PRTR5V0U4Y	SOT363 (SC-88)	2.0 x 1.25 x 0.95
				ESD protection for USB2.0 high-speed, SD-card, SIM card	IP4221CZ6-S	DFN1410-6 (SOT886)	1.45 x 1.0 x 0.48
				Dual ESD protection for USB2.0 high-speed, SD-card, SIM-card	IP4221CZ6-XS	DFN1010-6 (SOT891)	1.0 x 1.0 x 0.48

Common Mode Filter for USB 2.0

types in **bold** represent new products

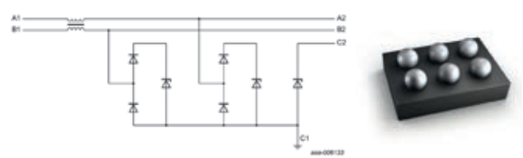
Baseband interface	Number of protected lines	C_{line} (pF)	ESD rating [1] max (kV)	Remark	Type	Package	Size (mm)
USB2.0	2	1.5	15	Common Mode filter with ESD protection for high-speed interfaces such as USB 2.0	**IP3319CX6**	WLCSP6	1.34 x 0.95 x 0.57

[1] according to IEC 61000-4-2 (contact discharge)

In the spotlight

IP3319CX6 - Common Mode Filter for USB2.0

- Very wide differential pass band >1 GHz
- Very broadband Common Mode attenuation
- Very low clamping ESD protection, excellent SoC protection
- Very small WLCSP6 package (footprint area 1.34 x 0.95 mm)

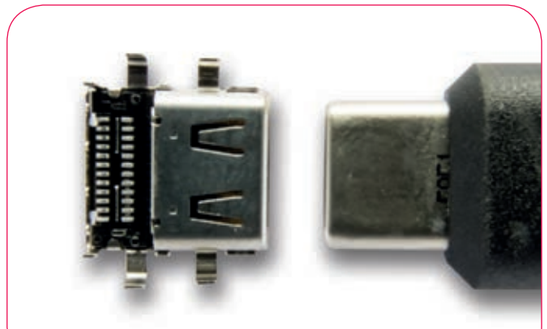


USB 3.x and eSATA protection and filtering

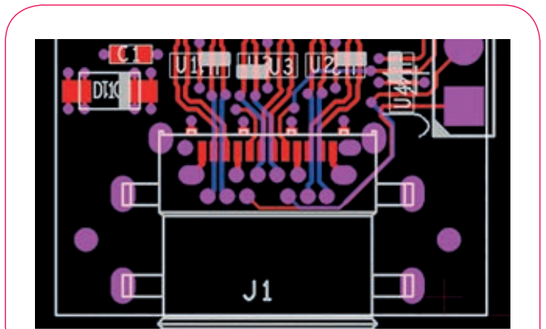
types in **bold** represent new products

Baseband interface	Number of protected lines	C_{line} (pF)	ESD rating max (kV)	Rdyn (Ω)	Remark	Type	Package	Size (mm)
USB3.0 - 5 Gbps	4	0.55	8	0.3 / 0.4	ESD protection for ultra high-speed interfaces	IP4292CZ10-TBR	DFN2510A-10 (SOT1176)	2.5 x. 1.0 x 0.48
		0.5	10			IP4294CZ10-TBR		
						PUSB3F96		
USB3.1 - 10 Gbps	6	0.29	15	0.27		**PUSB3FR6**	DFN2111-7 (SOT1358)	2.1 x 1.1 x 0.48
		0.27	15	0.5		**PUSB3TB6**		
	4	0.29	15	0.27		**PUSB3FR4**	DFN2510A-10 (SOT1176)	2.5 x. 1.0 x 0.48
	1	0.18	10	0.5		**PESD5V0R1BSF**	DSN0603-2 (SOD962)	0.6 x 0.3 x 0.3
		0.22	15	0.36		**PESD5V0H1BSF**		
		0.26	20	0.35		**PESD5V0C1BSF**		
		0.35	20	0.18		**PESD5V0C1USF**		

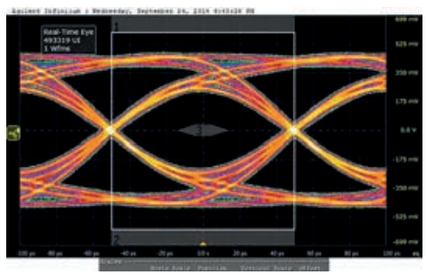
NXP paves the way for USB Type-C connector



USB Type-C receptacle USB Type-C plug



PUSB3FR4 routing diagram



PUSB3FR4 on standard FR4 testboard

PUSB3FR4 and the new Type-C connector

The perfect match. PUSB3FR4 supports protection and filtering for the new Type-C connector, in order to enable flawless direction-agnostic, faster charging and the smallest solution to support SuperSpeed USB.

USB 3.1 introduces data rates up to 10 Gbps

As shown in the eye diagram, NXP offers protection, which supports data rates up to 10 Gbps with low capacitance and optimized package layouts.

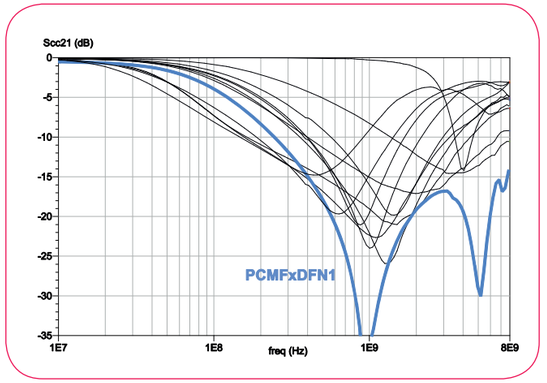
Common Mode Filter for USB 3.x

types in **bold** represent new products

Baseband interface	Number of protected line pairs	Type	Differential Mode 3dB frequency	Common Mode rejection 800 MHz - 2.4 GHz	C_d typical	V_{RWM}	ESD rating	Channel series resistance	Package	Size (mm)
USB3.x	1	**PCMF1USB30**	>7 GHz	>12	0.3	5	15	3	WLCSP5	0.8 x 1.2 x 0.5
	2								WLCSP10	1.6 x 1.2 x 0.5
	3								WLCSP15	2.4 x 1.2 x 0.5
	1	**PESD1USB30**		ESD protection only					WLCSP5	0.8 x 1.2 x 0.5
	2								WLCSP10	1.6 x 1.2 x 0.5
	3								WLCSP15	2.4 x 1.2 x 0.5

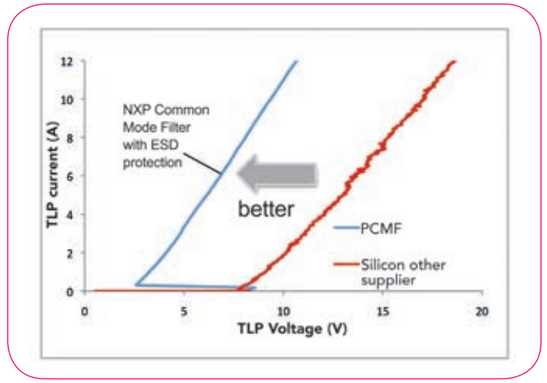
[1] according to IEC 61000-4-2 (contact discharge)

Common Mode suppression performance (for various ferrite and ceramic filters)



PCMFxDFN1 offers the largest bandwith on Common Mode suppression

Clamping performance of PCMF compared to silicon



The superior system-level protection is shown in the lower TLP clamping voltage

USB 3.x 5 Gbps eye diagrams

PCMFxUSB30 Only test board

NXPs Common Mode Filter offer:

- Best in class system-level protection due to deep snap-back and very low dynamic resistance
- Very wide-band Common Mode rejection to cover all critical frequencies
- Improved RF performance and small footprint compared to separate ESD/CMF solutions
- Protection for MIPI CSI, DSI, USB3.x, and HDMI

Common Mode Filter for video interfaces

types in **bold** represent new products

Baseband interface	Number of protected line pairs unidirectional	Number of protected line pairs bidirectional	Type	Differential Mode 3 dB frequency (typ.)	Common Mode insertion loss 800 MHz - 2.4 GHz	C_d pF typical	V_{rwm}	ESD rating [1] max (kV)	Channel series resistance	Package	Size (mm)
MIPI D-PHY	2	0	PCMF2DFN1	>2 GHz	<-24 dB	0.8	5	15	5 Ω	DFN2520-9 (SOT1333)	2.5 x 2.0 x 0.48
	3		PCMF3DFN1	>2 GHz						DFN4020-14 (SOT1334)	4.0 x 2.0 x 0.48
MIPI, HDMI	2		**PCMF2DFN2**	<3 GHz	<- 20 dB	0.7			2 Ω	DFN2520-9 (SOT1333)	2.5 x 2.0 x 0.48
	3		**PCMF3DFN2**		<- 20 dB					DFN4020-14 (SOT1334)	4.0 x 2.0 x 0.48

[1] according to IEC 61000-4-2 (contact discharge)

In the spotlight

PCMF-series: 2- and 3-line pair Common Mode filters for MIPI, HDMI

- Very wide differential pass band >2 GHz
- Very broadband Common Mode attenuation
- Very low clamping ESD protection, excellent SoC protection
- Very thin DFN plastic package (0.5 mm max)

Ethernet protection

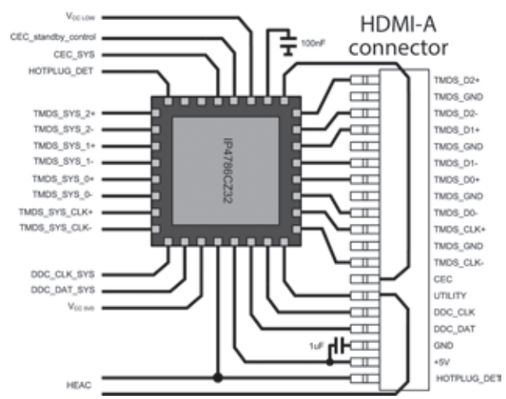
types in **bold** represent new products

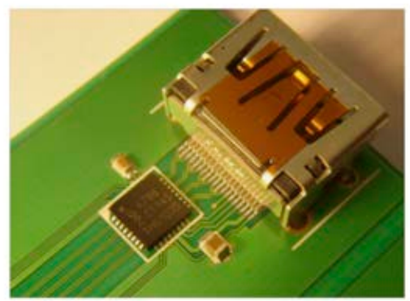
Baseband interface	Number of protected lines	C_{line} (pF)	Remark	Type	Package	Size (mm)
LAN	1	0.6	Ethernet ESD protection V_{RWM} = 3.3 V	PESD3V3U1UT	SOT23	2.9 x 1.3 x 1.0
			Ethernet ESD protection V_{RWM} = 5.0 V	PESD5V0U1UT		
			Ethernet ESD protection V_{RWM} = 12 V	PESD12VU1UT		
			Ethernet ESD protection V_{RWM} = 15 V	PESD15VU1UT		
			Ethernet ESD protection V_{RWM} = 24 V	PESD24VU1UT		
	4	1	Ethernet line-surge ESD protection	**IP4233CZ6**	SOT363 (SC-88)	2.0 x 1.25 x 0.95
			Ethernet ESD protection	IP4220CZ6	SOT457 (SC-74)	2.9 x 1.5 x 1.0

HDMI and memory-card signal conditioning

types in **bold** represent new products

Interface	Number of protected lines	Buffer	Level shifer	C_{line} (pF)	Resistor (Ω)	LDO	Remark	Type	Package	Size (mm)
HDMI tx	5	yes	yes	-	internal	-	Fully integrated for HDMI control lines including buffer for DDC, CEC, and Hot Plug module	IP4791CZ12	DFN2521-12 (SOT1156)	2.5 x 2.1 x 0.48
				10	1.75 k, 100 k		HDMI, DDC, CEC, Hot Plug ESD protection and biasing	IP4310CX8/P	WLCSP8	1.16 x 1.16 x 0.61
	13			100 Ω differential impedance	internal	CEC LDO. 5 V LDO	Fully integrated HDMI source solution with current limiter, buffer, and level shifter for DDC, CEC, and Hot Plug	IP4786CZ32	DFN5050-32 (SOT617)	5.0 x 5.0 x 0.85
							Fully integrated HDMI sink solution with buffer, and level shifter for DDC, CEC, and Hot Plug			
							Fully integrated HDMI source solution with enhanced ESD protection, current limiter, buffer, and level shifter for DDC, CEC, and Hot Plug			
							Fully integrated HDMI source solution with small package, current limiter, buffer, and level shifter for DDC, CEC, and Hot Plug	IP4786CZ32S	DFN4040-32 (SOT1318-1)	4.0 x 4.0 x 0.50
HDMI2.0	13	yes	yes	100 Ω differential impedance	integrated	–	Fully integrated HDMI source solution with current limiter, buffer, and level shifter for DDC, CEC, and Hot Plug	**IP4786CZ32**	DFN5050-32 (SOT617)	5.0 x 5.0 x 0.85
								IP4787CZ32		5.0 x 5.0 x 0.85
							Fully integrated HDMI source solution with enhanced ESD protection, current limiter, buffer, and level shifter for DDC, CEC, and Hot Plug	**IP4788CZ32**		5.0 x 5.0 x 0.85
							Fully integrated HDMI source solution in a small package with current limiter, buffer, and level shifter for DDC, CEC, and Hot Plug	**IP4786CZ32S**	DFN4040-32 (SOT1318-1)	4.0 x 4.0 x 0.5
SD3.0	6	yes	yes	-	internal	–	SD 3.0-compliant memory card with integrated dual voltage- level translator with EMI filter and ESD protection	**IP4856CX25/C**	WLCSP25	2.4 x 2.4 x 0.4
						1.8 V LDO	Fully integrated SD 3.0 card level shifter with buffer technology, LDO, and EMI filter	IP4855CX25	WLCSP25	2.4 x 2.4 x 0.4
								IP4755CZ24	DFN5535-24 (SOT815)	3.5 x 5.5 x 0.85



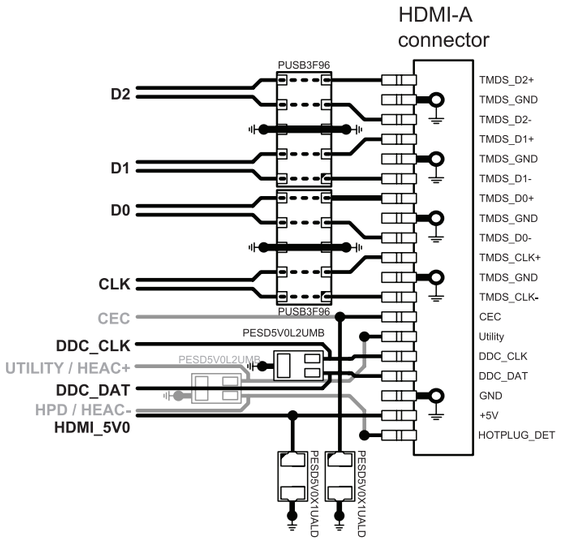


Video interface protection

types in **bold** represent new products

Baseband interface	Number of protected lines	C_{line} (pF)	Remark	Type	Package	Size (mm)
Display port	4	0.6	ESD protection for ultra high-speed interfaces	IP4283CZ10-TBR	DFN2510A-10 (SOT1176)	2.5 x 1.0 x 0.48
		0.55	ESD protection for ultra high-speed interfaces	IP4292CZ10-TBR		
		0.5	ESD protection for ultra high-speed interfaces	IP4294CZ10-TBR		
			ESD protection for ultra high-speed interfaces	**PHDMI2F4**		
		0.8	ESD protection for ultra high-speed interfaces	IP4285CZ9-TBB	DFN2110-9 (SOT1178)	2.1 x 1.0 x 0.48
HDMI	2	0.7	ESD protection for ultra high-speed interfaces	IP4282CZ6	DFN1410-6 (SOT886)	1.45 x 1.0 x 0.48
	4	0.6	ESD protection for ultra high-speed interfaces	IP4283CZ10-TBR	DFN2510A-10 (SOT1176)	2.5 x 1.0 x 0.48
		0.8	ESD protection for ultra high-speed interfaces	IP4285CZ9-TBB	DFN2110-9 (SOT1178)	2.1 x 1.0 x 0.48
		0.55	ESD protection for ultra high-speed interfaces	IP4292CZ10-TBR	DFN2510A-10 (SOT1176)	2.5 x 1.0 x 0.48
		0.5	ESD protection for ultra high-speed interfaces	**PHDMI2F4**		
			ESD protection for ultra high-speed interfaces	IP4294CZ10-TBR		
LVDS	4	0.8	Very low clamp ESD protection with 12 kV IEC ruggedness	**PUSB2X4D**	SOT457 (SC-74)	2.9 x 1.5 x 1.0
		0.8	Very low clamp ESD protection with 12 kV IEC ruggedness	**PUSB2X4Y**	SOT363 (SC-88)	2.0 x 1.25 x 0.95

PHDMI2F4 PESD HDMI application schematic



NFC antenna protection

types in **bold** represent new products

Interface	Number of protected lines (Bidirectional)	V_{RWM} [V]	C_{line} typ [pF]	C_{line} max [pF]	ESD rating [1] max [kV]	Configuration	Type	Package	Size
NFC Antenna	1	18	0.28	0.45	10	mse211	**PESD18VF1BSF**	DSN0603-2 (SOD962)	0.6 x 0.3 x 0.3
			0.35	0.5	10		PESD18VF1BL	DFN1006-2 (SOD882)	1.0 x 0.6 x 0.48
		24	0.25	0.4	10		**PESD24VF1BSF**	DSN0603-2 (SOD962)	0.6 x 0.3 x 0.3
			0.3	0.45	10		PESD24VF1BL	DFN1006-2 (SOD882)	1.0 x 0.6 x 0.48

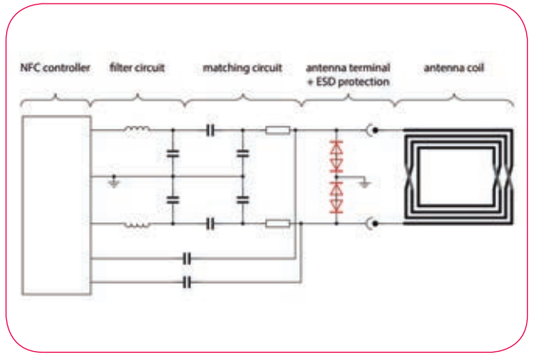
[1] according to IEC 61000-4-2 (contact discharge)

In the Spotlight

PESD24VF1BSF – NFC antenna protection in DSN0603-2 package

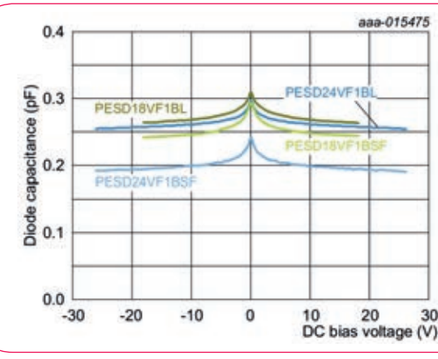
- High reverse standoff voltage V_{RWM}=24 V
- Ultra-low capacitance C_d typ = 0.25 pF
- Very small voltage dependency of the capacitance
- Ultra-small DSN0603-2 (SOD962) package (0.6 x 0.3 x 0.3 mm)

Circuit diagram



Using tiny packages makes PCB design more flexible

Diode capacitance versus bias voltage



The highly linear diode capacitance, with very small variation, minimizes signal degradation

Features

- Bidirectional configuration, allowing operating voltages up to 18 or 24 V
- Very low capacitance, enabling easy design of the antenna-matching circuit
- Very small voltage dependency of the diode capacitance, avoiding intermodulation distortion
- Small form-factor packages of 1006 (0402 inch) and 0603 (0201 inch) standard size

Benefits

- The phone's NFC antenna is often integrated into the battery cover or the battery itself and is connected to the NFC tags via small contacts on the phone, creating an entry point for ESD strikes that are potentially hazardous to the NFC IC. These new NXP devices are optimized for the requirements of th NFC system and ensure the best-possible protection of the NFC IC.

LCD and camera protection and filtering

types in **bold** represent new products

Baseband interface	Number of protected lines	Line small-signal equivalents			Digital interface clock speed (MHz)	Insertion loss S21 – -3 dB (MHz)	Type	Package	Size (mm)
		R_{line} (Ω)	C_{line} (pF)	L_{line} (nH)					
LCD display, camera, keypad	2	45	40	-	~50	145	PEMI2STD/HT	SOT665	1.6 x 1.2 x 0.5
			15	-	~125	376	PEMI2STD/HE		
		200	40	-	~40	119	PEMI2STD/WT		
	4	15	43	18	~60	175	IP3253CZ8-4-TTL	DFN1714-8 (SOT1166)	1.7 x 1.35 x 0.52
			50	18	~50	145	IP3254CZ8-4-TTL		
		40	18	-	~100	300	IP4252CZ8-4 -TTL		
		100	45	-	~40	130	IP4254CZ8-4-TTL		
			15	-	~110	330	IP4251CZ8-4-TTL		
		200	45	-	~35	110	IP4253CZ8-4-TTL		
		100	54	-	~35	98	**PEMI4CSP/RW**	WLCSP10	1.56 x 1.05 x 0.61
	6	15	50	18	~50	145	IP3254CZ12-6-TTL	DFN2514-12 (SOT1167)	2.5 x 1.35 x 0.53
			43	18	~60	175	IP3253CZ12-6-TTL		
		40	18	-	~100	300	IP4252CZ12-6-TTL		
		100	45	-	~40	130	IP4254CZ12-6-TTL		
			15	-	~110	330	IP4251CZ12-6-TTL		
		200	45	-	~35	110	IP4253CZ12-6-TTL		
		100	54	-	~35	98	**PEMI6CSP/RW**	WLCSP15	2.36 x 1.05 x 0.61
	7	70	25	-	~75	220	IP4337CX18/LF	WLCSP18	1.96 x 1.61 x 0.61
	8	15	43	18	~60	175	IP3253CZ16-8-TTL	DFN3314-16 (SOT1168)	3.3 x 1.35 x 0.53
			50	18	~50	145	IP3254CZ16-8-TTL		
		40	18	-	~100	300	IP4252CZ16-8-TTL		
		100	45	-	~40	130	IP4254CZ16-8-TTL		
			15	-	~110	330	IP4251CZ16-8-TTL		
		200	45	-	~35	110	IP4253CZ16-8-TTL		
		100	54	-	~35	98	**PEMI8CSP/RW/P**	WLCSP20	3.16 x 1.05 x 0.61
	10	70	25	-	~75	220	IP4338CX24/LF	WLCSP24	1.96 x 2.01 x 0.61
		1000	50	-	~7	22	IP4035CX24/LF		2.41 x 2.41 x 0.65
		200	50	-	~35	105	IP4041CX25/LF	WLCSP25	2.41 x 2.41 x 0.65

In the Spotlight

IP3253CZ8-4TTL – LCD and camera display protection in DFN1714-8

- Very wide pass-band 175 MHz
- Filters and protects 4, 6 or 8 data lines
- Very low clamping ESD protection, 15 kV IEC ESD ruggedness
- Very low series resistance of only 8 Ω
- Leadless DFN1714-8 (SOT1166) package with a height of only 0.52 mm

Audio interface protection and filtering

Baseband interface	Number of protected lines	Line small-signal equivalents		Remark	Type	Package	Size (mm)
		R_{line}	C_{line} (pF)				
Audio	2	0.9 Ω	290	Low-ohmic speaker (<~8 Ω)	IP4047CX6/LF	WLCSP6	1.56 x 1.01 x 0.65
		10 Ω	200	Low-ohmic speaker (>~8 Ω)	IP4048CX5/LF	WLCSP5	0.91 x 1.28 x 0.65
		68 Ω	110	Single-ended or differential microphone	IP4049CX5/LF		
	5	2.9 kΩ, 1 kΩ / 10 Ω	-	5-channel filter interface with integrated RC filters and biasing network for audio interfaces	IP4327CX15	WLCSP15	1.05 x 2.36 x 0.61

Memory- and SIM-card protection and filtering

types in **bold** represent new products

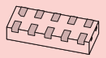
Baseband interface	Number of protected lines	Line small-signal equivalents		Digital interface clock speed (MHz)	Remark	Type	Package	Size (mm)
		R_{line}	C_{line} (pF)					
SIM card	3 + 2	47 Ω / 100 Ω	10	~20	Integrated low capacitance SIM-card passive filter array & USB ESD protection	IP4365CX11	WLCSP11	1.16 x 1.56 x 0.61
	3		20		Integrated SIM-card EMI filter and ESD protection	IP4064CX8/LF/P	WLCSP8	1.41 x 1.41 x 0.65
					Smaller size, integrated SIM-card EMI filter and ESD protection	IP4364CX8/LF/P		1.16 x 1.16 x 0.61
			10		Smaller size, low-capacitance integrated SIM-card EMI filter and ESD protection	IP4366CX8/P		
			20		Integrated SIM-card EMI filter and ESD protection	IP4264CZ8-20-TTL	DFN1714-8 (SOT1166)	1.7 x 1.35 x 0.52
	4	-	1	~240	Quad-channel, low-capacitance ESD protection	IP4221CZ6-S	DFN1410-6 (SOT886)	1.0 x 1.0 x 0.48
					Quad-channel, low-capacitance ESD protection	IP4221CZ6-XS	DFN1010-6 (SOT891)	1.0 x 1.0 x 0.48
SD-card / MMC	4	47 Ω / 13 kΩ / 56 kΩ	25	~30	MMC ESD protection, pull-up resistors	IP4051CX11/LF	WLCSP11	1.44 x 1.96 x 0.65
	6	40 Ω	12	>52	(Mini) SD card/trans flash ESD protection, EMI filter	**IP4252CZ12-6-TTL**	DFN2514-12 (SOT1167)	2.5 x 1.35 x 0.53
		40 Ω / 100 Ω	11	-	6-channel Micro-SD memory-card interface ESD protection filter	IP4340CX15	WLCSP15	1.56 x 1.56 x 0.5
	6 + 2	40 Ω	12	>52	(Mini) SD card/trans flash ESD protection, EMI filter	**IP4252CZ16-8-TTL**	DFN3314-16 (SOT1168)	3.3 x 1.35 x 0.53
SD 3.0	6	-	0.27	5000	6-line bidirectional ESD protection for ultra high-speed interfaces	**PUSB3TB6**	DFN2111-7 (SOT1358)	2.1 x 1.1 x 0.5

Battery and charger protection

Baseband interface	Number of protected lines	C_{line} (pF)	Diode voltage	Remark	Type	Package	Size (mm)
Battery & charger protection	1	180	Breakdown 16 V	Power diode	IP4085CX4	WLCSP4	0.91 x 0.91 x 0.65
		160	Breakdown 16 V	Power diode	IP4386CX4		0.76 x 0.76 x 0.61
		290	Breakdown 10 V	Power diode	IP4387CX4		
		160	V_{RWM} = 12 V	Power diode	PESD12VS1UJ	SOD323F (SC-90)	1.7 x 1.25 x 0.7
		160	V_{RWM} = 12 V	Power diode	PESD12VS1UA	SOD323 (SC-76)	1.7 x 1.25 x 0.95
		480	V_{RWM} = 5 V	Power diode	PESD5V0S1UJ	SOD323F (SC-90)	1.7 x 1.25 x 0.7
		480	V_{RWM} = 5 V	Power diode	PESD5V0S1UA	SOD323 (SC-76)	1.7 x 1.25 x 0.95

Automotive high-speed network protection

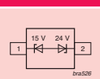
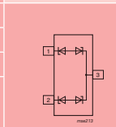
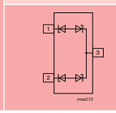
types in **bold** represent new products

Number of protected lines	V_{RWM} (V)	C_{line} typ (pF)	I_{RM} max @3V (µA)	ESD rating [1] max (kV)	Configuration	Type	Package	Size (mm)
4	5.5	0.5	1	10		**PESD2LVDS**	DFN2510A-10 (SOT1176) 	2.5 x 1.0 x 0.5
	5.5	0.6	1	8		PESD1LVDS	DFN2510-10 (SOT1165) 	2.5 x 1.0 x 0.48
	5.5	0.6	1	8		PRTR5V0U4D	SOT457 	2.9 x 1.5 x 1.0

[1] according to IEC 61000-4-2 (contact discharge)

Automotive in-vehicle network bus line protection

types in **bold** represent new products

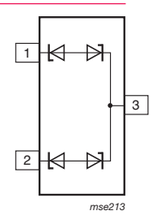
Number of protected lines bidirectional	V_{RWM} (V)	C_{line} typ (pF)	C_{line} max (pF)	P_{PP} [1] max (W)	ESD rating [2] max (kV)	I_R max [µA] @ V_{RWM}	Configuration	Type	Package	Size (mm)
1	15 (diode 1) 24 (diode 2)	13	17	160	23	0.05		PESD1LIN	SOD323 (SC-76) 	1.7 x 1.25 x 0.95
2	24	11	17	200	23	0.05		PESD1CAN	SOT23 	2.9 x 1.3 x 1.0
		25	30	230	30	0.01		PESD2CAN		
		11	17	200	23	0.05		PESD1FLEX		
		9.3	12	150	23	0.05		PESD1CAN-U	SOT323 	2.0 x 1.25 x 0.95
1	26.5	9.3	11	150	23	0.05		**PESD1IVN-U**	SOT323 	2.0 x 1.25 x 0.95
2								**PESD2IVN-U**		

[1] 8 / 20 µs surge pulse according to IEC 61000-4-5 [2] according to IEC 61000-4-2 (contact discharge)

In the spotlight

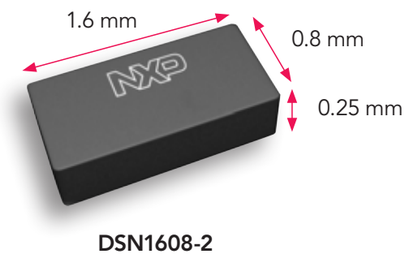
PESD2IVN-U: CAN bus protection in very small SOT323 package

- Protection for 2 in-vehicle network BUS lines
- High reverse standoff voltage V_{RWM} = 26.5 V
- Very small SOT323 package (2.0 x 1.25 x 0.95 mm)
- AEC-Q101 compliant
- ESD robustness of up to 23 kV (contact)
- Very good capacitance matching



1200 W surge protection for charger ports in mobile devices

A new 1200 W surge protection device in a 1.6 x 0.8 mm small, and 0.25 mm low package for slim mobiles



DSN1608-2

Features and benefits

- 7 types from V_{RWM} = 5 to 26 V
- High surge rating:
  - P_{PPM} = 1200 W 8/20 µs pulse (IEC61000-4-5)
  - P_{PPM} = 200 W 10/1000 µs pulse (IEC61643-321)
- Very compact and thin package
- Low leakage current: down to 1 nA, reduces power consumption
- Dynamic resistance down to 0.1 Ω
- High ESD robustness: V_{ESD} = 30 kV (IEC61000-4-2)

Surge pulses from the power supply, e.g. via a car charger, are a severe threat for the charger port VBUS line of smart phones and other portables. Supply voltages of these chargers often exceed the 5 V level – requiring high reverse standoff voltages.

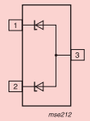
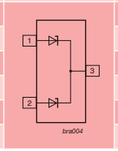
NXP's PTVSxZ1USK series is ideally suited to protect the charger port and offers

- Superior electrical performance
- A high PCB design flexibility and,
- Easy routing

TVS diodes, 1200 W – selection guide

Type	V_{RWM} (V)	V_{br} min (V)	V_{br} max (V)	V_d @ Ippm 8/20µs (V)	I_{ppm} 8/20µs (A)	P_{ppm} 8/20µs (W)	I_{ppm} 10/1000µs (A)	V_d @ I_{ppm} 10/1000µs (V)	Ppm 10/1000µs (W)	I_{rm} typ @ V_{rwm} (µA)	I_{rm} max @ V_{rwm} (µA)
PTVS5V0Z1USK	5	6.4	7.80	18	80	1200	20	12	200	0.025	4
PTVS7V5Z1USK	7.5	8.33	9.65	23	70	1200	12.4	16.1	200	0.025	4
PTVS10VZ1USK	10	11.1	12.9	29	60	1200	9.44	21.2	200	0.025	4
PTVS12VZ1USK	12	13.3	15.4	32	53	1200	8.08	24.8	200	0.025	4
PTVS15VZ1USK	15	16.7	19.4	40	44	1200	6.56	30.5	200	0.025	2
PTVS18VZ1USK	18	20	23.2	43	40	1200	5.52	36.2	200	0.025	1
PTVS26VZ1USK	26	28.9	33.4	60	25	1200	3.76	53.2	200	0.025	0.5

TVS diodes, 24 / 40 W

Power (W) (10 / 1000 µs waveform) [1]	V_{RWM} (V)	V_{BR} min (V) @ I_R	V_{BR} typ (V) @ I_R	V_{BR} max (V) @ I_R	I_R (mA)	ESD rating [1] max (kV)	C_{line} typ (pF)	V_{CL} max [1] (V) @ I_{PP}	I_{PP} [1] (A)	I_{RM} max (µA) @ V_{RWM}	Configuration	Type	Package	Size (mm)
24	3	5.32	5.6	5.88	20	30	210	8	3	5		MMBZ5V6AL	SOT23 	2.9 x 1.3 x 1.0
	3	5.89	6.2	6.51	1	30	175	8.7	2.76	0.2		MMBZ6V2AL		
	4.5	6.48	6.8	7.14	1	30	150	9.6	2.5	0.3		MMBZ6V8AL		
	6	8.65	9.1	9.56	1	30	155	14	1.7	0.1		MMBZ9V1AL		
	6.5	9.5	10	10.5	1	30	130	14.2	1.7	0.02		MMBZ10VAL		
40	8.5	11.4	12	12.6	1	30	110	17	2.35	0.005		MMBZ12VAL		
	12	14.25	15	15.75	1	30	85	21	1.9	0.005		MMBZ15VAL		
	14.5	17.1	18	18.9	1	30	70	25	1.6	0.005		MMBZ18VAL		
	17	19	20	21	1	30	65	28	1.4	0.005		MMBZ20VAL		
	22	25.65	27	28.35	1	30	48	40	1	0.005		MMBZ27VAL		
	26	31.35	33	34.65	1	30	45	46	0.87	0.005		MMBZ33VAL		
	8.5	11.4	12	12.6	1	30	110	17	2.35	0.005		MMBZ12VDL		
	12.8	14.3	15	15.8	1	30	85	21.2	1.9	0.005		MMBZ15VDL		
	14.5	17.1	18	18.9	1	30	70	25	1.6	0.005		MMBZ18VCL		
	17	19	20	21	1	30	65	28	1.4	0.005		MMBZ20VCL		
	22	25.65	27	28.35	1	30	48	38	1	0.005		MMBZ27VCL		
	26	31.35	33	34.65	1	30	45	46	0.87	0.005		MMBZ33VCL		

[1] 10 / 1000 µs according to IEC 61643-321 [2] according to IEC 61000-4-2 (contact discharge)

In the spotlight

PTVSxU1UPA series: 300 W surge protection in DFN2020-3 package

- Series of 6 types from V_{RWM}= 7.5 to 26 V
- Peak pulse power of 300 W for 10 / 1000 µs pulse
- Small package size of 2.0 x 2.0 mm
- Very low package height of 0.62 mm typ
- Charger-port protection in mobile devices

TVS diodes for mobile applications

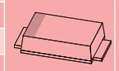
Power (W) (10 / 1000 µs waveform) [1]	V_{RWM} (V)	V_{BR} min (V) @ I_R	V_{BR} typ (V) @ I_R	V_{BR} max (V) @ I_R	I_R (mA)	V_{CL} max [1] (V) @ I_{PP}	I_{PP} [1] (A)	I_{RM} typ (µA) @ V_{RWM}	I_{RM} max (µA) @ V_{RWM}	Type	Package	Size (mm)
300	7.5	8.33	8.77	9.21	1	12.9	23.3	0.3	50	PTVS7V5U1UPA	DFN2020-3 (SOT1061) 	2.0 x 2.0 x 0.62
	10	11.1	11.7	12.3	1	17	17.6	0.008	2.5	PTVS10VU1UPA		
	12	13.3	14	14.7	1	19.9	15.1	0.005	2.5	PTVS12VU1UPA		
	15	16.7	17.6	18.5	1	24.4	12.3	0.001	0.1	PTVS15VU1UPA		
	18	20	21	22.1	1	29.2	10.3	0.001	0.1	PTVS18VU1UPA		
	26	28.9	30.4	31.9	1	42.1	7	0.001	0.1	PTVS26VU1UPA		

[1] 10 / 1000 µs according to IEC 61643-321

TVS diodes, 400 W

Power (W) (10/1000 µs waveform) [1]	V_{RWM} (V)	V_{BR} min (V) @ I_R	V_{BR} typ (V) @ I_R	V_{BR} max (V) @ I_R	I_R (mA)	V_{CL} max [1] (V) @ I_{PP}	I_{PP} [1] (A)	I_{RM} typ (µA) @ V_{RWM}	I_{RM} max (µA) @ V_{RWM}	Type (T_j max = 150 °C)	Type (T_j max = 185 °C)	Package	Size (mm)
350	3.5	5.20	5.60	6.00	10	8.0	43.8	5	600	PTVS3V3S1UR	PTVS3V3S1UTR	SOD123W 	2.6 x 1.7 x 1.0
400	5.0	6.40	6.70	7.00	10	9.2	43.5	5	400	PTVS5V0S1UR	PTVS5V0S1UTR		
	6.0	6.67	7.02	7.37	10	10.3	38.8	5	400	PTVS6V0S1UR	PTVS6V0S1UTR		
	6.5	7.22	7.60	7.98	10	11.2	35.7	5	250	PTVS6V5S1UR	PTVS6V5S1UTR		
	7.0	7.78	8.20	8.60	10	12.0	33.3	3	100	PTVS7V0S1UR	PTVS7V0S1UTR		
	7.5	8.33	8.77	9.21	1	12.9	31.0	0.2	50	PTVS7V5S1UR	PTVS7V5S1UTR		
	8.0	8.89	9.36	9.83	1	13.6	29.4	0.03	25	PTVS8V0S1UR	PTVS8V0S1UTR		
	8.5	9.44	9.92	10.40	1	14.4	27.8	0.01	10	PTVS8V5S1UR	PTVS8V5S1UTR		
	9.0	10.00	10.55	11.10	1	15.4	26.0	0.005	5	PTVS9V0S1UR	PTVS9V0S1UTR		
	10	11.10	11.70	12.30	1	17.0	23.5	0.005	2.5	PTVS10VS1UR	PTVS10VS1UTR		
	11	12.20	12.85	13.50	1	18.2	22.0	0.005	2.5	PTVS11VS1UR	PTVS11VS1UTR		
	12	13.30	14.00	14.70	1	19.9	20.1	0.005	2.5	PTVS12VS1UR	PTVS12VS1UTR		
	13	14.40	15.15	15.90	1	21.5	18.6	0.001	0.1	PTVS13VS1UR	PTVS13VS1UTR		
	14	15.60	16.40	17.20	1	23.2	17.2	0.001	0.1	PTVS14VS1UR	PTVS14VS1UTR		
	15	16.70	17.60	18.50	1	24.4	16.4	0.001	0.1	PTVS15VS1UR	PTVS15VS1UTR		
	16	17.80	18.75	19.70	1	26.0	15.4	0.001	0.1	PTVS16VS1UR	PTVS16VS1UTR		
	17	18.90	19.90	20.90	1	27.6	14.5	0.001	0.1	PTVS17VS1UR	PTVS17VS1UTR		
	18	20.00	21.00	22.10	1	29.2	13.7	0.001	0.1	PTVS18VS1UR	PTVS18VS1UTR		
	20	22.20	23.35	24.50	1	32.4	12.3	0.001	0.1	PTVS20VS1UR	PTVS20VS1UTR		
	22	24.40	25.60	26.90	1	35.5	11.3	0.001	0.1	PTVS22VS1UR	PTVS22VS1UTR		
	24	26.70	28.10	29.50	1	38.9	10.3	0.001	0.1	PTVS24VS1UR	PTVS24VS1UTR		
	26	28.90	30.40	31.90	1	42.1	9.5	0.001	0.1	PTVS26VS1UR	PTVS26VS1UTR		
	28	31.10	32.80	34.40	1	45.4	8.8	0.001	0.1	PTVS28VS1UR	PTVS28VS1UTR		
	30	33.30	35.10	36.80	1	48.4	8.3	0.001	0.1	PTVS30VS1UR	PTVS30VS1UTR		
	33	36.70	38.70	40.60	1	53.3	7.5	0.001	0.1	PTVS33VS1UR	PTVS33VS1UTR		
	36	40.00	42.10	44.20	1	58.1	6.9	0.001	0.1	PTVS36VS1UR	PTVS36VS1UTR		
	40	44.40	46.80	49.10	1	64.5	6.2	0.001	0.1	PTVS40VS1UR	PTVS40VS1UTR		
	43	47.80	50.30	52.80	1	69.4	5.8	0.001	0.1	PTVS43VS1UR	PTVS43VS1UTR		
	45	50.00	52.65	55.30	1	72.7	5.5	0.001	0.1	PTVS45VS1UR	PTVS45VS1UTR		
	48	53.30	56.10	58.90	1	77.4	5.2	0.001	0.1	PTVS48VS1UR	PTVS48VS1UTR		
	51	56.70	59.70	62.70	1	82.4	4.9	0.001	0.1	PTVS51VS1UR	PTVS51VS1UTR		
	54	60.00	63.15	66.30	1	87.1	4.6	0.001	0.1	PTVS54VS1UR	PTVS54VS1UTR		
	58	64.40	67.80	71.20	1	93.6	4.3	0.001	0.1	PTVS58VS1UR	PTVS58VS1UTR		
	60	66.70	70.20	73.70	1	96.8	4.1	0.001	0.1	PTVS60VS1UR	PTVS60VS1UTR		
	64	71.10	74.85	78.60	1	103.0	3.9	0.001	0.1	PTVS64VS1UR	PTVS64VS1UTR		

TVS diodes, 600 W

Power (W) (10 / 1000 µs waveform) [1]	V_{RWM} (V)	V_{BR} min (V) @ I_R	V_{BR} typ (V) @ I_R	V_{BR} max (V) @ I_R	I_R (mA)	V_{CL} max [1] (V) @ I_{PP}	I_{PP} [1] (A)	I_{RM} typ (µA) @ V_{RWM}	I_{RM} max (µA) @ V_{RWM}	Type (T_j max = 150 °C)	Type (T_j max = 185 °C)	Package	Size (mm)
600	3.5	5.20	5.60	6.00	10	8	75	5	600	PTVS3V3P1UP	PTVS3V3P1UTP	SOD128 	3.8 x 2.6 x 1.0
	5	6.40	6.70	7.00	10	9.2	65.2	5	400	PTVS5V0P1UP	PTVS5V0P1UTP		
	6	6.67	7.02	7.37	10	10.3	58.3	5	400	PTVS6V0P1UP	PTVS6V0P1UTP		
	6.5	7.22	7.60	7.98	10	11.2	53.6	5	250	PTVS6V5P1UP	PTVS6V5P1UTP		
	7	7.78	8.20	8.60	10	12	50	3	100	PTVS7V0P1UP	PTVS7V0P1UTP		
	7.5	8.33	8.77	9.21	1	12.9	46.5	0.2	50	PTVS7V5P1UP	PTVS7V5P1UTP		
	8	8.89	9.36	9.83	1	13.6	44.1	0.03	25	PTVS8V0P1UP	PTVS8V0P1UTP		
	8.5	9.44	9.92	10.40	1	14.4	41.7	0.01	10	PTVS8V5P1UP	PTVS8V5P1UTP		
	9	10.00	10.55	11.10	1	15.4	39	0.005	5	PTVS9V0P1UP	PTVS9V0P1UTP		
	10	11.10	11.70	12.30	1	17	35.3	0.005	2.5	PTVS10VP1UP	PTVS10VP1UTP		
	11	12.20	12.85	13.50	1	18.2	33	0.005	2.5	PTVS11VP1UP	PTVS11VP1UTP		
	12	13.30	14.00	14.70	1	19.9	30.2	0.005	2.5	PTVS12VP1UP	PTVS12VP1UTP		
	13	14.40	15.15	15.90	1	21.5	27.9	0.001	0.1	PTVS13VP1UP	PTVS13VP1UTP		
	14	15.60	16.40	17.20	1	23.2	25.9	0.001	0.1	PTVS14VP1UP	PTVS14VP1UTP		
	15	16.70	17.60	18.50	1	24.4	24.6	0.001	0.1	PTVS15VP1UP	PTVS15VP1UTP		
	16	17.80	18.75	19.70	1	26	23.1	0.001	0.1	PTVS16VP1UP	PTVS16VP1UTP		
	17	18.90	19.90	20.90	1	27.6	21.7	0.001	0.1	PTVS17VP1UP	PTVS17VP1UTP		
	18	20.00	21.00	22.10	1	29.2	20.5	0.001	0.1	PTVS18VP1UP	PTVS18VP1UTP		
	20	22.20	23.35	24.50	1	32.4	18.5	0.001	0.1	PTVS20VP1UP	PTVS20VP1UTP		
	22	24.40	25.60	26.90	1	35.5	16.9	0.001	0.1	PTVS22VP1UP	PTVS22VP1UTP		
	24	26.70	28.10	29.50	1	38.9	15.4	0.001	0.1	PTVS24VP1UP	PTVS24VP1UTP		
	26	28.90	30.40	31.90	1	42.1	14.2	0.001	0.1	PTVS26VP1UP	PTVS26VP1UTP		
	28	31.10	32.80	34.40	1	45.4	13.2	0.001	0.1	PTVS28VP1UP	PTVS28VP1UTP		
	30	33.30	35.10	36.80	1	48.4	12.4	0.001	0.1	PTVS30VP1UP	PTVS30VP1UTP		
	33	36.70	38.70	40.60	1	53.3	11.3	0.001	0.1	PTVS33VP1UP	PTVS33VP1UTP		
	36	40.00	42.10	44.20	1	58.1	10.3	0.001	0.1	PTVS36VP1UP	PTVS36VP1UTP		
	40	44.40	46.80	49.10	1	64.5	9.3	0.001	0.1	PTVS40VP1UP	PTVS40VP1UTP		
	43	47.80	50.30	52.80	1	69.4	8.6	0.001	0.1	PTVS43VP1UP	PTVS43VP1UTP		
	45	50.00	52.65	55.30	1	72.7	8.3	0.001	0.1	PTVS45VP1UP	PTVS45VP1UTP		
	48	53.30	56.10	58.90	1	77.4	7.8	0.001	0.1	PTVS48VP1UP	PTVS48VP1UTP		
	51	56.70	59.70	62.70	1	82.4	7.3	0.001	0.1	PTVS51VP1UP	PTVS51VP1UTP		
	54	60.00	63.15	66.30	1	87.1	6.9	0.001	0.1	PTVS54VP1UP	PTVS54VP1UTP		
	58	64.40	67.80	71.20	1	93.6	6.4	0.001	0.1	PTVS58VP1UP	PTVS58VP1UTP		
	60	66.70	70.20	73.70	1	96.8	6.2	0.001	0.1	PTVS60VP1UP	PTVS60VP1UTP		
	64	71.10	74.85	78.60	1	103	5.8	0.001	0.1	PTVS64VP1UP	PTVS64VP1UTP		

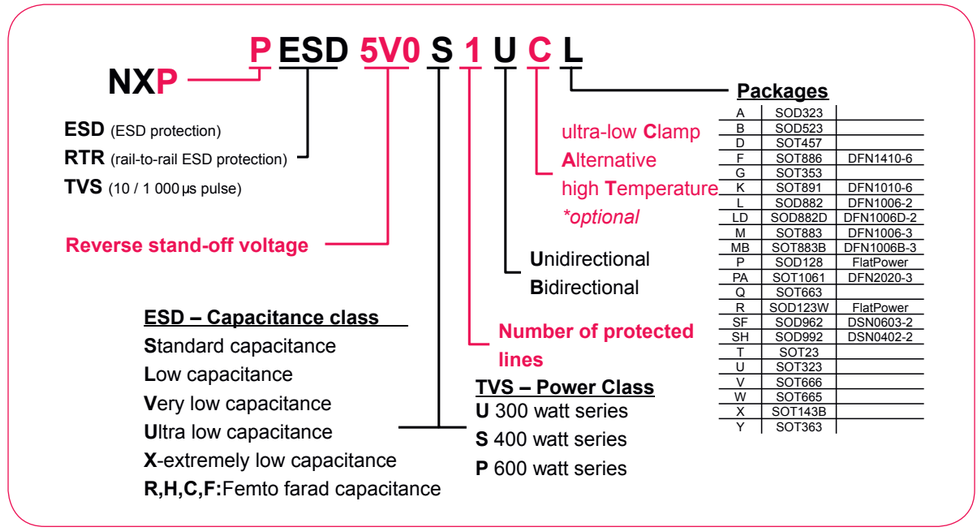
[1] 10 / 1000 µs according to IEC 61643-321

In the spotlight

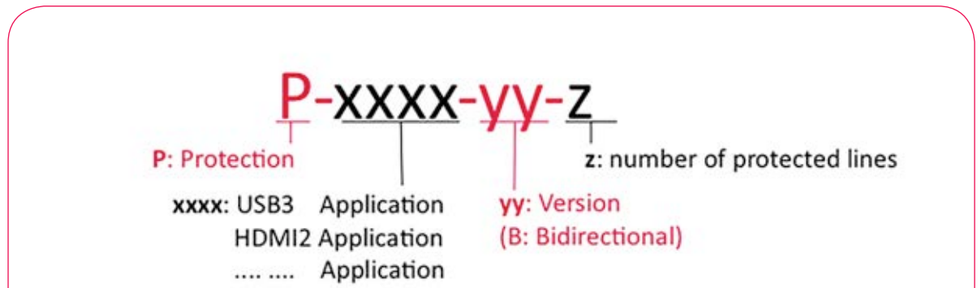
High-temperature TVS series in FlatPower package

- Available in 400 W (PTVSxS1UTR) and 600 W (PTVSxP1UTP) power classes with 35 devices each
- Very high maximal junction temperature of 185 °C
- Reverse standoff voltages from 3.3 to 64 V
- Low height, high performance - save board space by replacing SMA & SMB packages with low-profile SOD123W and SOD128 packages
- AEC-Q101 qualified

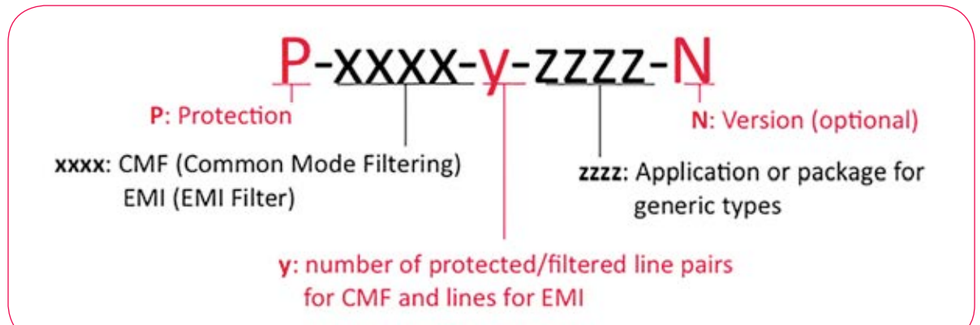
Protection and signal-conditioning nomenclature



Application specific protection nomenclature



Application specific filtering nomenclature



MOSFETs

Small-signal MOSFET portfolio overview

Small-signal MOSFET Portfolio structure

Leaded packages | **Leadless packages**

High R_{DSon}

- 2N7002 family
- NX7002AK family
- BSS84 family
- BSS138 family
- NX3008 family
- NX3020 family
- BSH …

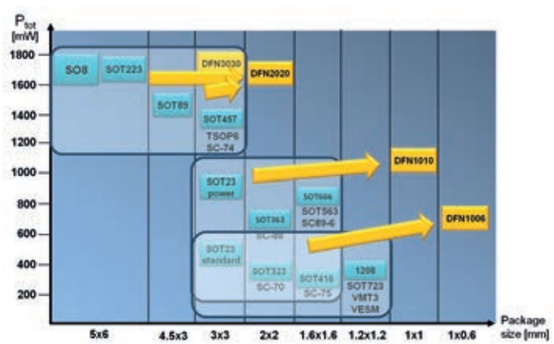
Low R_{DSon}

- PMT…/ PHT… SOT223
- PMV… SOT23
- PMN… SOT457
- PMF… SOT323
- PMG… SOT363

- PMPB… - single DFN2020
- PMDPB …. – dual DFN2020
- PMZ… single DFN1006
- PMXB… single DFN1010

- Broadliner in high to low ohmic MOSFETs down to 10 mΩ
- Package range from SOT223 package (5 x 6 mm footprint) down to DFN1006 leadless package (1 x 0.6 mm footprint)
- Adressing broad application range from portable to automotive
- Innovative DFN package portfolio for best power dissipation on smallest footprint for miniaturization

From leaded to leadless packages

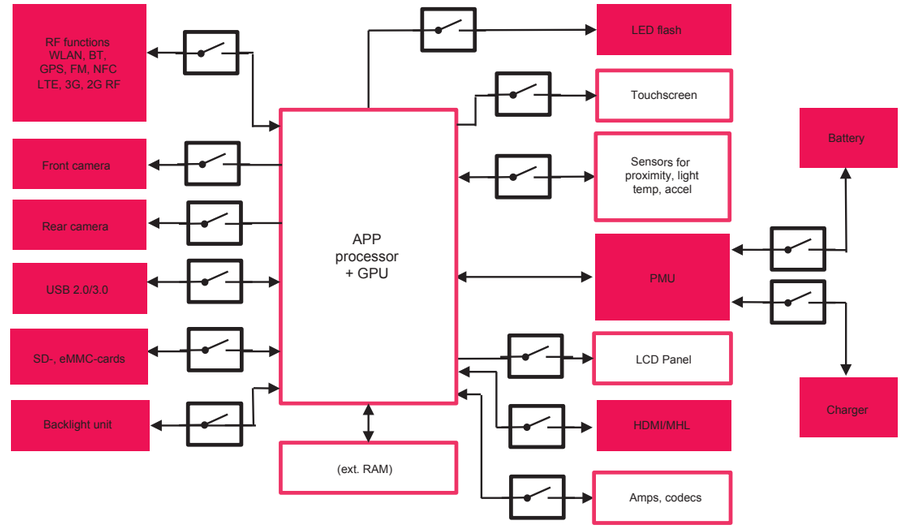


Leadless packages replace established leaded packages. They provide the same power capability compared to larger packages on a smaller size or provide a better thermal performance on the same footprint size.

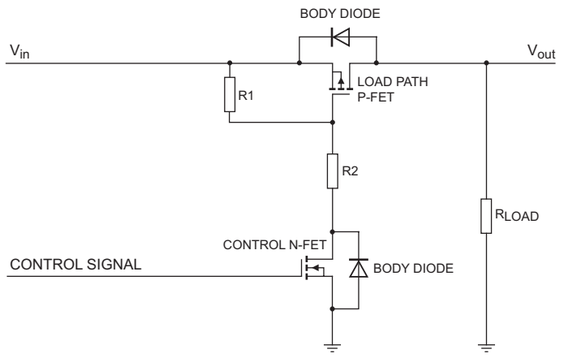
These features make them the ideal choice for space-constrained applications where size and performance matter.

The graph shows package replacement options, with improved power dissipation performance, for a dedicated R_{DSon} range of greater than 10 mΩ.

Enhanced switch application for low R_{DSon} MOSFETs



Load switch application for high R_{DSon} MOSFETs



- Further application examples for high R_{DSon} MOSFETs are discharger switch and the inverter

Small-signal MOSFETs portfolio for enhanced and standard switch applications

	Application	Package	V_{DS} range (in V)	R_{DSon} range (in Ω)	NXP portfolio
Portables	Enhanced switch	DFN2020MD-6 DFN2020-6 DFN1010d-3	12 - 30	10 - 100	PMPBX-series PMDPBx-series PMXB-series
	Standard switch	DFN1006-3 DFN1010B-6	12 - 30	> 100	PMZx-series PMDXBx-series NX30x-series
Computing / Consumer	Enhanced switch	SOT23	20 - 60	10 - 100	PMVx-series
	Standard switch	SOT23	20 - 60	> 100	NX7002x-series NX30x-series BSSx-series

DFN1006 – The new standard for portables

- DFN1006 is now the standard for portables
- Roughly 85% smaller than a SOT23, but delivers the same power dissipation (360 mW)
- DFN1006 replaces larger packages in the same R_{DSon} range of > 120 mΩ

Choose the next generation - DFN1006

Replace larger package types with R_{DSON} values > 120 mΩ

SOT416 (SC-75)

Rohm VMT
SOT723
Toshiba VESM

DFN1006 package

Types with similar thermal and electrical performance		
Package	SOT416	DFN1006-3
Package size	1.6 x 0.8 x 0.77 mm	1.0 x 0.6 x 0.48 mm
Solder footprint	2.2 x 2.0 mm = 4.4 mm²	1.3 x 0.9 mm = 1.17 mm²
N-channel > 1 Ω range	2N7002BKT	NX7002BKM
N-channel > 1 Ω range	NX3008NBKT	NX3008NBKM
P-channel > 1 Ω range	NX3008PBKT	NX3008PBKM
N-channel 300 mΩ range	PMR280UN	PMZ290UNE

DFN1006 – The ideal replacement for SOT416

75% size reduction!

Small-signal MOSFETs in ultra-small DFN1006 and DFN1006B packages

types in **bold** represent new products

Package																DFN1006-3 (SOT883)	DFN1006B-3 (SOT883B)
																	
Size (mm)																1.0 x 0.6 x 0.48	1.0 x 0.6 x 0.37
P_{tot} (mW)																250	250
Polarity	V_{DS} (V)	V_{GS} (V)	I_D (A)	$V_{GS(th)}$ min (V)	$V_{GS(th)}$ max (V)	t_{on} typ (ns)	t_{off} typ (ns)	Q_G typ (nC)	ESD protection (kV)	R_{DSon} typ (mΩ) @ V_{GS} = 10 V	4.5 V	2.5 V	1.8 V	1.5 V	1.2 V		
N-channel	20	8	1.9 / 1.6	0.45	0.95	5.3	16	1.6	2	-	120 / 155	155 / 190	195 / 235	255 / -	-	**PMZ130UNE**	**PMZB150UNE**
			1	0.5	0.95	6	86	0.45	2	-	290	420	600	-	-	**PMZ290UNE**	PMZB290UNE
		12	0.6	0.45	0.95	5.6	19	0.4	1	-	470	620	845	1125	2210	**PMZ600UNE**	**PMZB600UNE**
			2.15	0.5	1.5	5	11	0.72	-	-	270	440	-	-	-	PMZ270XN	
			1	0.5	1.5	5	11	0.72	-	-	300	470	-	-	-		PMZB300XN
	30	8	1.5	0.45	0.95	-	-	-	2	-	200	230	260	300	-	**PMZ200UNE**	**PMZB200UNE**
			1	0.45	0.95	4	12	0.8	2	-	380	450	520	600	-	**PMZ390UNE**	**PMZB390UNE**
			0.9	0.5	1.05	11	54	0.77	2	-	370	470	630	-	-	**PMZ370UNE**	PMZB370UNE
			0.53	0.6	1.1	15	69	0.52	2	-	1000	1400	2000	-	-	**NX3008NBKM**	NX3008NBKMB
		12	1.87	0.5	1.5	6.5	14	0.65	-	-	350	520	-	-	-	PMZ350XN	
			0.93	0.5	1.5	6.5	14	0.65	-	-	380	550	-	-	-		PMZB380XN
	60	20	0.45	1.1	2.1	5	12	0.5	2	1000	1300	-	-	-	-	**2N7002BKM**	2N7002BKMB
			0.35	1.1	2.1	4.7	6.9	1	2	2200	2500	-	-	-	-	**NX7002BKM**	**NX7002BKMB**
P-channel	20	8	1.4	0.45	0.95	4	26	1.3	1.8	-	330	420	520	-	-	**PMZ350UPE**	PMZB350UPE
			0.68	0.5	1.3	18	80	0.76	2	-	670	1200	1800	-	-		PMZB670UPE
			0.5	0.45	0.95	2.3	13.5	1.19	1	-	1020	1270	1700	2300	3500	**PMZ950UPE**	**PMZB950UPE**
	30	8	1	0.45	0.95	2.9	22	1.45	2	-	400	480	600	760	-	**PMZ320UPE**	**PMZB320UPE**
			0.3	0.6	1.1	19	65	0.55	2	-	2800	5300	-	-	-	**NX3008PBKM**	NX3008PBKMB
	50	20	0.23	1.1	2.1	13	48	0.26	1	4500	5700	-	-	-	-	BSS84AKM	BSS84AKMB

In the spotlight

PMZ130UNE – smallest low R_{DSon} N-channel MOSFET in DFN1006

- 20 V N-channel with R_{DSon} of 120 mΩ @ V_{GS} = 4.5 V (typ)
- I_D max of 1.9 A for medium curent load switch
- Ultra-small footprint: 1.0 x 0.6 x 0.48 mm
- Low-voltage gate drive with VGSth = 0.7 V (typ)
- R_{DSon} specified to 1.5 V for low drive voltages

Key features

- N- and P-channel
- Low R_{DSon} down to 120 mΩ
- I_D up to 2.15 A
- Low voltage drive ($V_{GS(th)}$ = 0.65 V typ)
- Voltage range of 20 to 60 V
- ESD protection of up to 2 kV

Package

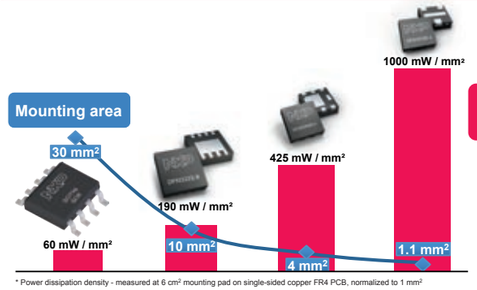
- 1.0 x 0.6 mm footprint
- Single package with different heights:
  - 0.5 mm for DFN1006 (SOT883)
  - 0.37 mm for DFN1006B (SOT883B)
- Power dissipation (P_{tot}) of 360 mW

Key applications

- Smartphones
- Wearables
- Tablets

DFN1010 – First 3 A MOSFETs on 1.1 mm² footprint

DFN1010 – Mounting area versus power density

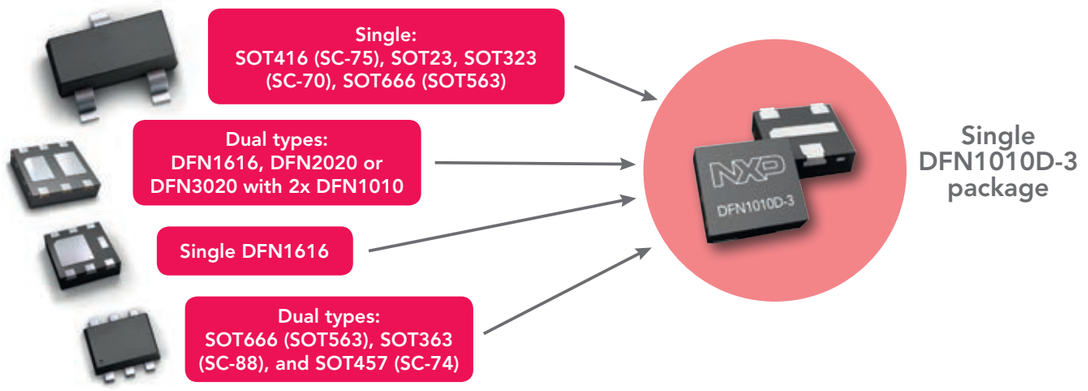


Power dissipation density [mW / mm²]*

* Power dissipation density - measured at 6 cm² mounting pad on single-sided copper FR4 PCB, normalized to 1 mm²

DFN1010 packages offer the highest power density of 1000 mW / mm², enabling high-performance designs for space-constrained applications

The next generation of small packaging - Featuring currents up to 3 A on a 1.1 mm² footprint



The DFN1010 can be used for new designs in space-constrained applications and to replace larger packages in the same R_{DSon} range

Types with similar thermal and electrical performance		
Package	SOT363	DFN1010B-6
Package size	2.0 x 1.25 x 0.95 mm	1.1 x 1.0 x 0.37 mm
Solder footprint	2.2 x 2.0 mm = 4.4 mm²	1.3 x 1.35 mm = 1.75 mm²
N-channel > 1 Ω range	2N7002BKS	NX7002BKXB
N-channel > 1 Ω range	NX3008NBKS	NX3008NBKXB
P-channel > 1 Ω range	NX3008PBKS	NX3008PBKXB

DFN1010B-6 dual – The ideal replacement for SOT363

Small-signal MOSFETs in DFN1010D-3 single and DFN1010B-3 dual packages

types in **bold** represent new products

Package																		DFN1010D-3 (SOT1215)	DFN1010B-6 (SOT1216)
																			
Size (mm)																		1.1 x 1.0 x 0.37	1.1 x 1.0 x 0.37
P_{tot} (mW)																		1000	350
Configuration	Polarity	V_{DS} (V)	V_{GS} (V)	I_D (A)	$V_{GS(th)}$ min (V)	$V_{GS(th)}$ max (V)	t_{on} typ (ns)	t_{off} typ (ns)	Q_G typ (nC)	ESD protection (kV)	R_{DSon} typ (mΩ) @ V_{GS} = 10 V	4.5 V	2.5 V	1.8 V	1.5 V	1.2 V			
Single	N-channel	12	8	1.1	0.4	0.9	6	18	6.6	1	-	34	39	46	50	121		PMXB40UNE	
		20	8	3.2	0.5	0.9	6	17	5.7	1	-	42	48	56	64	-		PMXB43UNE	
		30	20	3.2	1	2	3	11	3.6	-	49	56	-	-	-	-		PMXB56EN	
				3.2	1	2.5	3	11	6	1	44	56	-	-	-	-		PMXB65ENE	
		80	20	1.1	1.3	2.7	2	9	3	2	345	390	-	-	-	-		PMXB360ENEA	
	P-channel	12	8	3.2	0.4	1	6.2	27	6.7	1.5	-	59	78	120	198	880		PMXB65UPE	
		20	8	2.9	0.4	1	6	29	6.8	1.5	-	69	86	130	205	950		PMXB75UPE	
				1.2	0.45	0.95	3	18	1.25	1.5	-	350	450	600	760	1200		PMXB350UPE	
		30	20	2.4	1	2.5	4	16	6.2	1	100	125	-	-	-	-		PMXB120EPE	
Dual	N-ch	20	8	0.6	0.45	0.95	5.6	19	0.4	1	-	470	620	845	1125	2210			PMDXB600UNE
		30	8	0.4	0.6	1.1	26	88	0.52	2	-	1000	1400	2000	-	-			**NX3008NBKXB**
		60	20	0.35	1.1	2.1	4.7	6.9	1	2	2200	2500	-	-	-	-			**NX7002BKXB**
	P-ch	30	8	0.23	0.6	1.1	49	103	0.55	2	-	2800	5300	-	-	-			**NX3008PBKXB**
		20	8	0.5	0.45	0.95	2.3	13.5	1.19	1	-	1020	1270	1700	2300	3500			PMDXB950UPE
Complementary	N	20	8	0.6	0.45	0.95	5.6	19	0.4	1	-	470	620	845	1125	2210			PMCXB900UE
	P	20	8	0.5	0.45	0.95	2.3	13.5	1.19	1	-	1020	1270	1700	2300	3500			

Key features

- N- and P-channel
- Low R_{DSon} to 34 mΩ
- I_D to 3.2 A
- Low voltage drive ($V_{GS(th)}$ = 0.65 V typ)
- Voltage range of 12 to 80 V
- ESD protection to more than 1 kV

Package

- 1.1 x 1.0 x 0.37 mm package size
- Single and dual packages
- High power dissipation (P_{tot}) of 1000 mW single and 350 mW for dual package
- Single package with tin-plated, solderable side pads for improved mounting and automotive conformity

1+1 = 1: DFN1010B-6 dual equals two DFN1006

- Less board space
- Reduced pick and place costs
- Same electrical functionality

In the spotlight

PMXB40UNE – Low R_{DSon} of only 34 mΩ

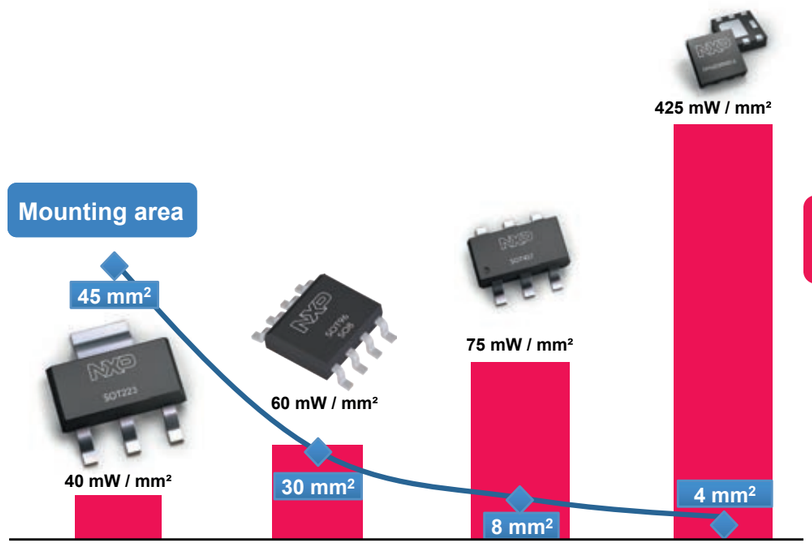
Small and leadless ultrathin SMD package: 1.1 x 1.0 x 0.37 mm

20 V N-channel with R_{DSon} of 34 mΩ @ V_{GS} = 4.5 V (typ)

Tin-plated 100% solderable side pads for optical solder inspection

DFN2020 – The low R_{DSON} choice for values > 10 mΩ

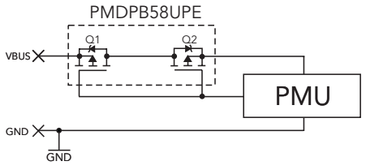
DFN2020 – The must-have package for R_{DSon} values of > 10 mΩ



* Power dissipation density - measured at 6 cm² mounting pad on single-sided copper FR4 PCB, normalized to 1 mm²

DFN2020 offers a power density of 425 mW / mm² on a footprint of only 4 mm², enabling high-performance designs for space-constrained applications

Low R_{DSon} types for USB OTG Vbus protection



In the spotlight

PMPB15XP – Low R_{DSon} P-channel MOSFET in DFN2020

- 12 V P-channel with R_{DSon} of 15 mΩ @ V_{GS} = 4.5 V (typ)
- I_D max of 11.8 A for medium curent load switch
- Small and leadless ultrathin SMD plastic package: 2.0 x 2.0 x 0.65 mm
- Exposed drain pad for excellent thermal conduction
- R_{DSon} specified to 1.8 V for low drive voltages

Key features

- N- and P-channel
- Low R_{DSon} down to 10 mΩ
- I_D up to 13 A
- Low voltage drive ($V_{GS(th)}$ = 0.65 V typ)
- Voltage range of 12 to 100 V
- ESD protection of 3 kV

Package

- 2.0 x 2.0 x 0.65 mm package size
- Single and dual packages
- High power dissipation (P_{tot}) of 1250 mW for single and dual packages
- Single package with tin-plated, solderable side pads for improved mounting and automotive conformity

Small-signal MOSFETs in DFN2020MD-6 single and DFN2020-6 dual packages

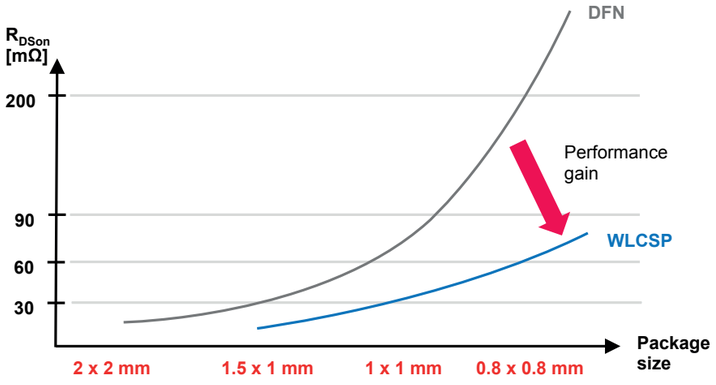
types in **bold** represent new products

Package															DFN2020MD-6 (SOT1220)	DFN2020-6 (SOT1118)
Size (mm)															2.0 x 2.0 x 0.65	2.0 x 2.0 x 0.65
P_{tot} (mW)															1250	1250
Configuration	Polarity	V_{DS} (V)	V_{GS} (V)	I_D (A)	$V_{GS(th)}$ min (V)	$V_{GS(th)}$ max (V)	t_{on} typ (ns)	t_{off} typ (ns)	Q_G typ (nC)	ESD protection (kV)	R_{DSon} typ (mΩ) @ V_{GS} = 10 V	4.5 V	2.5 V	1.8 V		
Single	N-channel	20	8	11.3	0.4	1	9	26	8.8	2	-	14	17	21	**PMPB12UNE**	
				9.4	0.4	1	7	17	4.7	2	-	19	25	36	**PMPB20UNE**	
			12	12.9	0.4	0.9	13	54	23	2.2	-	10	12	16	PMPB10XNE	
				10.4	0.4	0.9	9	31	13.4	-	-	18	21	23	PMPB15XN	
				10.1	0.4	0.9	9	31	11.6	2.1	-	19	23	31	PMPB23XNE	
		30	12	11.3	0.4	0.9	12	54	24	2.2	-	13	14	17	PMPB13XNE	
				5	0.4	0.9	8	33	12.4	2.1	-	28	32	37	PMPB29XNE	
				5.5	0.45	1.2	6	21	5.1	-	-	37	55	-	PMPB33XN	
			20	13	1	2	9	17	13.7	-	12	14	-	-	PMPB11EN	
				10.4	1	2	9	9	7.2	-	16.5	20.5	-	-	PMPB20EN	
		60	20	12.9	1	3	9	12	12.1	-	34	40	-	-	PMPB40SNA	
				-	1.3	2.7	-	-	-	2	44	52	-	-	**PMPB55ENEA**	
				3	1.3	2.7	4	10.5	6.2	2.7	72	85	-	-	PMPB85ENEA	
		80	20	2.8	1.3	2.7	5	15	9.9	2.8	80	92	-	-	PMPB95ENEA	
				1.9	1.3	2.7	3.5	9.5	4.8	2	175	195	-	-	PMPB215ENEA	
	P-channel	12	12	11.8	0.47	0.9	18	85	67	-	-	15	17	21	PMPB15XP	
		20	12	10.3	0.47	0.9	16	43	28.8	-	-	19	21	27	PMPB19XP	
				10.3	0.47	0.9	13	92	30	2.4	-	19	22	28	PMPB20XPE	
				5	0.47	0.9	12	91	30	2.3	-	28	31	36	PMPB29XPE	
				7.9	0.47	0.9	12	62	15	-	-	30	35	45	PMPB33XP	
				5	0.47	0.9	9	57	15.6	2.3	-	39	45	56	PMPB43XPE	
		30	12	5	0.47	0.9	15	28	14	-	-	47	54	74	PMPB47XP	
			20	8.8	1	2.5	10	28	30	-	24	32	-	-	PMPB27EP	
				6.8	1	2.5	7.4	27	17	-	40	55	-	-	PMPB48EP	
Dual	N-ch	20	12	5.3	0.4	0.9	4	40	14.4	-	-	32	40	60		PMDPB30XN
		30	12	4	0.5	1.5	8	12	1.9	2	-	55	86	-		**PMDPB56XNE**
				3.1	0.5	1.5	6	18	1.65	1.8	-	95	130	-		**PMDPB95XNE2**
	P-channel	20	8	4.5	0.45	0.95	7	41	6.3	2	-	58	74	97		PMDPB58UPE
				3.7	0.45	0.95	6	47	5.4	2	-	82	107	142		PMDPB85UPE
			12	-	0.75	1.25	-	-	-	2	-	44	60			**PMDPB42XPE**
				4.5	0.47	0.9	4	135	16.5	-	-	55	75	110		PMDPB55XP
				4.2	0.75	1.25	7	33	5	2	-	66	98			PMDPB70XPE
				3.7	0.4	1	6	120	5.7	-	-	80	95	120		PMDPB80XP
		30	12	3.8	0.45	1	3	112	5.2	-	-	70	89	-		PMDPB70XP
MOSFET-Schottky	P-channel	20	12	3.7	0.4	1	6	120	5.7	-	-	80	95	120		PMFPB8032XP
				3.7	0.4	1	6	120	5.7	-	-	80	95	120		PMFPB8040XP
Pre-biased NPN	P	30	12	3.4	0.45	1	3	112	5.2	-	-	85	105	-		PMC85XP
Complementary	N	20	12	5.3	0.4	0.9	4	40	14.4	-	-	26	33	50		PMCPB5530X
	P	20	12	4.5	0.4	0.9	4	40	8.1	-	-	55	75	110		

Small-signal MOSFETs in WLCSP4 and WLCSP6 packages

Package													WLCSP4	WLCSP6
Size (mm)													0.78 x 0.78 x 0.35	1.48 x 0.98 x 0.35
Ptot (mW)													1300	1300
Polarity	V_{DS} (V)	V_{GS} (V)	I_D (A)	$V_{GS(th)}$ min (V)	$V_{GS(th)}$ max (V)	t_{on} typ (ns)	t_{off} typ (ns)	Q_G typ (nC)	ESD protection (kV)	R_{DSon} typ (mΩ) @ V_{GS} = 4.5 V	2.5 V	1.8 V	1.5 V		
N	12	8	3.2	0.4	1	-	-	-	2	57	65	77	-	PMCM440VNE	
			4.1	0.4	1	-	-	-	2	34	40	55	-	PMCM4401VNE	
P	12	8	3.3	0.5	1	-	-	-	2	55	100	120	-	PMCM4401VPE	
N	12	8	7.8	0.4	1	-	-	-	2	20	23	28	-		PMCM650VNE
			9.8	0.4	1	-	-	-	2	13	16	19	-		PMCM6501VNE
P	12	8	7.8	0.5	1	-	-	-	2	20	25	35	-		PMCM6501VPE

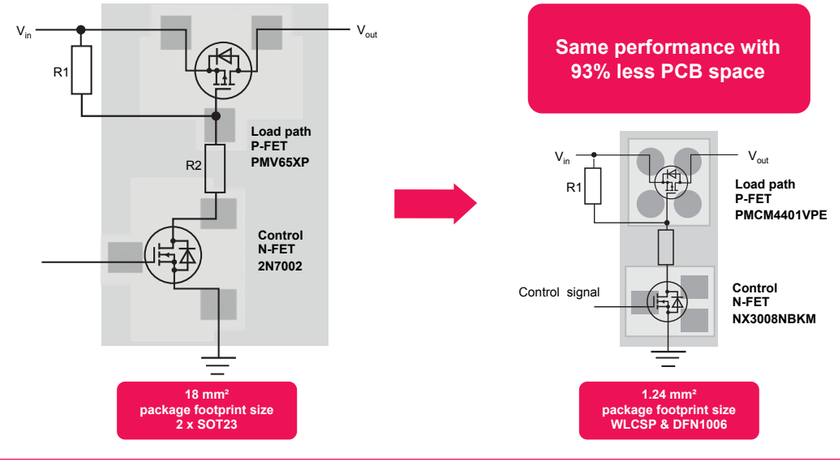
WLCSP – MOSFETs with ultra-low R_{DSon}



MOSFETs in WLCSP

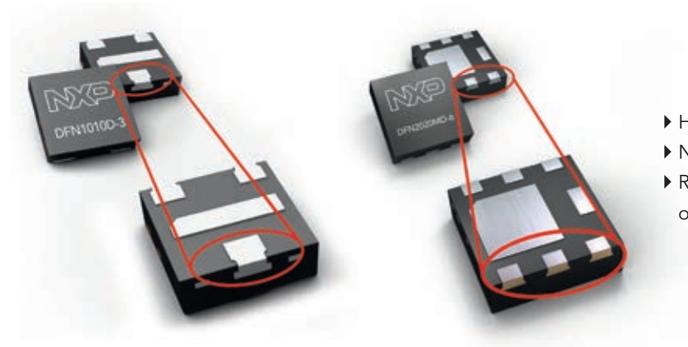
- Improved R_{DSon} performance compared to DFN packages
- Smallest footprint
- High power capability of 1300 mW
- Ideal for mobile and space-constrained applications

Loadswitch – WLCSP versus leaded packages



Small-signal MOSFETs for automotive

DFN1010 and DFN2020 with solderable side pads



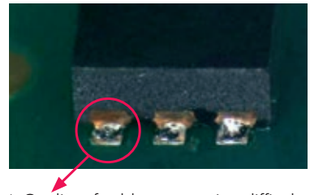
- High-quality solder connections
- No complete wetting on side pad
- Reduction of production costs through optical visual solder inspection

Comparison of solder capability

NXP package
100% solderable side pads

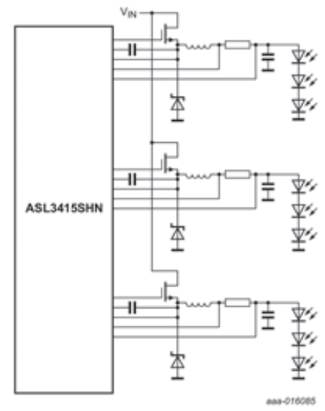
100% solder wetting solution
with new 2 x 2 mm leadless package DFN2020MD-6

Packages from other suppliers



- Quality of solder connection difficult to determine
- Very limited options for optical solder inspection

Reference design for LED lighting



In the spotlight

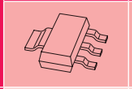
PMPB85ENEA - Automotive-compliant 60 V N-channel MOSFET with I_D max of 4.4 A in DFN2020MD-6 (SOT1220)

- 60 V N-channel with R_{DSon} of typ. 72mΩ @ V_{GS} = 10 V
- Small and leadless ultrathin SMD plastic package: 2.0 x 2.0 x 0.65 mm
- Exposed drain pad for excellent thermal conduction
- ESD protection to 2 kV HBM
- AEC-Q101 qualified

Automotive MOSFETs

Automotive-compliant small-signal MOSFETs

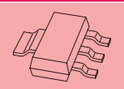
types in **bold** represent new products

Package															SOT223	SOT457 (SC-74)	SOT23	SOT363 (SC-88)	SOT323 (SC-70)	SOT666	DFN2020MD-6 (SOT1220)	DFN1010D-3 (SOT1215)	DFN1006 (SOT883)
																							
Size (mm)															6.5 x 3.5 x 1.65	2.9 x 1.5 x 1.0	2.9 x 1.3 x 1.0	2.0 x 1.25 x 0.95	2.0 x 1.25 x 0.95	1.6 x 1.2 x 0.55	2.0 x 2.0 x 0.65	1.1 x 1.0 x 0.37	1.0 x 0.6 x 0.5
Ptot (mW)															1700	600	250	300	200	300	1250	1000	250
Polarity	Configuration	V_{DS} (V)	V_{GS} (V)	I_D (A)	$V_{GS(th)}$ min (V)	$V_{GS(th)}$ max (V)	t_{on} typ (ns)	t_{off} typ (ns)	Q_G typ (nC)	ESD protection (kV)	R_{DSon} typ (mΩ) @ V_{GS} = 10 V	4.5 V	2.5 V	1.8 V									
N-channel	Single	20	8	5.2	0.5	1.5	12	128	6.4	2	-	24	28	72			**PMV28UNEA**						
			12	5.9	0.75	1.25	16	49	31	2	-	14	20	-			**PMV20XNEA**						
		30	8	0.4	0.6	1.1	26	88	0.52	2	-	1000	1400	2000			NX3008NBK		NX3008NBKW				
			20	4.9	1	2.5	9.9	29	20	2.8	15	21	-	-			**PMV25ENEA**						
				3.7	1	2.5	-	-	-	1.6	-	-	-	-			**PMV50ENEA**						
				1.9	1	2.5	5.4	12	5.4	1.6	54	74	-	-			**PMV100ENEA**						
		40	20	2.5	1	2.5	14	14	2.4	1	95	120	-	-			PMV130ENEA						
		60	20	12.9	1	3	9	12	12.1	-	34	40	-	-							PMPB40SNA		
				-	1.3	2.7	-	-	-	2	44	52	-	-							**PMPB55ENEA**		
				2.8	1	2.5	9	33	19	2.8	46	52	-	-			**PMV55ENEA**						
				3	1.3	2.7	4	10.5	6.2	2.7	72	85	-	-							PMPB85ENEA		
				1.9	1	2.5	-	-	-	2	-	-	-	-			**PMV120ENEA**						
				1.4	1	2.5	-	-	-	2	-	-	-	-			**PMV230ENEA**						
				0.7	1	2.5	-	-	-	2.5	-	-	-	-			**PMV450ENEA**						
				0.36	0.9	1.5	5	13	0.72	-	900	1000	-	-			BSS138P		BSS138PW				
				0.36	0.48	1.6	10	58	0.6	1.5	1000	1100	1400	-			BSS138BK		BSS138BKW				
				0.3	1	2.5	11	19	0.5	2	1000	1300	-	-			2N7002BK		2N7002BKW				2N7002BKM
				0.3	1	2.5	16	60	1.09	3	1100	1300	-	-			2N7002CK						
				0.2	0.8	1.5	5	36	0.39	Yes	2700	3000	4000	-			BSS138AKA						
		80	20	1.9	1.3	2.7	3.5	9.5	4.8	2	175	195	-	-							PMPB215ENEA		
				2.8	1.3	2.7	5	15	9.9	2.8	80	92	-	-							**PMPB95ENEA**		
				1.1	1.3	2.7	2	9	3	2	345	390	-	-								PMXB360ENEA	
		100	20	-	1.3	2.7	-	-	-	2	275	300	-	-	**PMT280ENEA**								
				-	1.3	2.7	-	-	-	2	520	560	-	-	**PMT560ENEA**								
	Dual	20	8	0.8	0.5	0.95	10	117	0.45	2	-	380	620	1100						PMDT290UNE			
		30	8	0.4	0.6	1.1	26	88	0.52	2	-	1000	1400	2000				NX3008NBKS		NX3008NBKV			
		60	20	0.3	1	2.5	11	19	0.5	2	1000	1300	-	-				2N7002BKS					
				0.36	0.48	1.6	10	58	0.6	1.5	1000	1100	1400	-				BSS138BKS					
				0.36	0.9	1.5	5	13	0.72	-	900	1000	-	-				BSS138PS					
P-channel	Single	20	8	6	0.45	0.95	8	50	15.6	4	-	37	45	59		**PMN40UPEA**							
				2	0.5	1.1	7	50	6	-	-	100	155	210			NX2301P						
			12	5.7	0.75	1.25	15	37	15	2	-	27	39	-		**PMN27XPEA**							
				5.7	0.75	1.25	17	33	11.5	2	-	41	56	-		**PMN42XPEA**							
				4.4	0.75	1.25	-	-	-	2	-	26	-	-			**PMV30XPEA**						
				3.5	0.75	1.25	11	61	8.5	-	-	48	71	-			**PMV48XPA**						
				4.1	0.75	1.25	15	51	8.7	-	-	48	72	-		**PMN48XPA**							
				3.3	0.75	1.25	7	36	5	2	-	67	99	-			**PMV65XPEA**						
				4.1	0.75	1.25	7	40	5.2	2	-	70	101	-		**PMN70XPEA**							
				2.2	0.75	1.25	-	-	-	2	-	93	-	-			**PMV100XPEA**						
		30	8	0.23	0.6	1.1	49	103	0.55	2	-	2800	5300	-			NX3008PBK		NX3008PBKW				
			20	4	1	3	6	38	18	3	23	39	-	-			**PMV50EPEA**						
		40	20	1.5	1	2.5	4	26	4.7	1	180	220	-	-			PMV250EPEA						
		50	20	0.2	1.1	2.1	24	73	0.26	1	5300	6000	-	-			BSS84AK		BSS84AKW				BSS84AKM
		60	20	2.2	1	3	-	-	-	2	99	110	-	-			**PMV100EPEA**						
				0.9	1	3	-	-	-	2	217	241	-	-			**PMV240EPEA**						
		70	20	2.3	1	3	-	-	-	2	156	177	-	-	**PMT200EPEA**								
	Dual	20	8	0.55	0.5	1.3	48	152	0.76	2	-	670	1200	1800						PMDT670UPE			
		30	8	0.2	0.6	1.1	49	103	0.55	2	-	2800	5300	-				NX3008PBKS		NX3008PBKV			
		50	20	0.16	1.1	2.1	24	73	0.26	1	5300	6000	-	-				BSS84AKS		BSS84AKV			
N	Compl	20	8	0.73	0.5	0.95	10	117	0.45	2	-	290	420	600				PMGD290UCEA					
P		20	8	0.5	0.5	1.3	48	152	0.76	2	-	670	1200	1800									

Small-signal MOSFETs

Small-signal MOSFETs single (N-channel)

types in **bold** represent new products

Package													SOT223	SOT89	SOT23	SOT323 (SC-70)	DFN1006-3 (SOT883)	DFN1006B-3 (SOT883B)
																		
Size (mm)													6.5 x 3.5 x 1.65	4.5 x 2.5 x 1.5	2.9 x 1.3 x 1.0	2.0 x 1.25 x 0.95	1.0 x 0.6 x 0.48	1.0 x 0.6 x 0.37
P_{tot} (mW)													1700	600	250	200	250	250
V_{DS} (V)	V_{GS} (V)	I_D (A)	$V_{GS(th)}$ min (V)	$V_{GS(th)}$ max (V)	t_{on} typ (ns)	t_{off} typ (ns)	Q_G typ (nC)	ESD protection (kV)	R_{DSon} typ (mΩ) @ V_{GS} = 10 V	4.5 V	2.5 V	1.8 V						
20	8	5.2	0.5	1.5	12	128	6.4	2	-	24	28	72			**PMV28UNEA**			
		1.9	0.4	1	8	31	2.2	2	-	63	77	114				**PMF63UNE**		
		2.2	0.4	1	6	21	2.6	2	-	64	78	110			**PMV65UNE**			
		1.05	0.4	-	2	45	3.9		-	140	180	240			BSH105			
		1.9 / 1.6	0.45	0.95	5.3	16	1.6	2	-	120 / 155	155 / 190	195 / 235					**PMZ130UNE**	**PMZB150UNE**
		1	0.5	0.95	6	86	0.45	2	-	290	420	600					**PMZ290UNE**	PMZB290UNE
		0.6	0.45	0.95	5.6	19	0.4	1	-	470	620	845					**PMZ600UNE**	**PMZB600UNE**
	12	5.9	0.75	1.25	16	49	31	2	-	14	20	-			**PMV20XNEA**			
		8.6	0.47	0.9	7	135	7.7		-	15	18	22			**PMV16XN**			
		4.8	0.5	1.5	12	128	6.4	2	-	19	26	-			**PMV20XNE**			
		5.4	0.4	0.9	7	35	6.2		-	24	30	40			**PMV30UN2**			
		3.2	0.5	1.5	11	93	4.9	2	-	28	39	-			**PMV30XNE**			
		2.15	0.5	1.5	16	17	0.72	-	-	270	440	-					PMZ270XN	PMZB300XN
30	8	1.5	0.45	0.95	-	-	-	2	-	200	230	260					**PMZ200UNE**	**PMZB200UNE**
		1	0.45	0.95	4	12	0.8	2	-	380	450	520					**PMZ390UNE**	**PMZB390UNE**
		0.9	0.5	1.05	20	81	0.77	2	-	370	470	630					PMZ370UNE	PMZB370UNE
		0.85	0.4	-	6	27		-	-	400	-	600			BSH103			
		0.4	0.6	1.1	26	88	0.52	2	-	1000	1400	2000			NX3008NBK	NX3008NBKW	NX3008NBKM	NX3008NBKMB
	12	4.4	0.4	0.9	9	34	7	-	-	36	43	56			**PMV40UN2**			
		0.9	0.5	1.5	8	11	0.74	2	-	234	324	-				**PMF250XNE**		
		1.87	0.5	1.5	16	19.5	0.65	-	-	350	520	-					PMZ350XN	PMZB380XN
	20	7.6	1	2	9	9	7.2	-	17	21	-	-			**PMV20EN**			
		4.9	1	2.5	9.9	29	20	2.8	15	21	-	-			**PMV25ENEA**			
		3.7	1	2.5	-	-	-	1.6	-	-	-	-			**PMV50ENEA**			
		10	1	2.8	18	44	24	-	20	30	-	-	BSP030					
		3.1	1	2.5	18	78	6.5	-	28	37	-	-			**PMV37EN2**			
		5.1	1	2	3	11	3.6	-	35	43	-	-			**PMV45EN2**			
		2.1	1	2.5	3	15	2.6	2	70	90	-	-			**PMV90ENE**			
		6	1	2.8	14	36	-	-	80	120	-	-	BSP100					
		1.9	1	2	3	15	6.4	-	77	102	-	-			BSH108			
		0.18	0.8	1.5	10	51	0.34	-	2700	3000	4000	-			NX3020NAK	NX3020NAKW		
40	20	2.5	1	2.5	14	14	2.4	1	95	120	-	-			PMV130ENEA			
50	20	0.1	0.4	1.8	2	5		2	2800	3800	-	-			BSN20BK			
55	8	0.3	0.4	1.3	4	11	1	-	-	2300	2400	3100				BSH121		
	10	0.3	0.4	1.3	4	11	1	3	-	2300	2400	3100			BSH111BK			
60	20	2.8	1	2.5	9	33	19	2.8	46	52		-			**PMV55ENEA**			
		1.9	1	2.5	-	-	-	2	-	-	-	-			**PMV120ENEA**			
		1.4	1	2.5	-	-	-	2	-	-	-	-			**PMV230ENEA**			
		0.7	1	2.5	-	-	-	2.5	-	-	-	-			**PMV450ENEA**			
		0.36	0.9	1.5	5	13	0.72	-	900	1000		-			BSS138P	BSS138PW		
		0.36	0.48	1.6	10	58	0.6	1.5	1000	1100	1400	-			BSS138BK	BSS138BKW		
		0.3	1	2.5	11	19	0.5	2	1000	1300	-	-					2N7002BKM	2N7002BKMB
		0.19	1.1	2.1	12	34	0.33	Yes	3000	3700	-	-			NX7002AK	NX7002AKW		
		0.27	1.1	2.1	4.7	6.9	1	2	2200	2500	-	-			NX7002BK	NX7002BKW	**NX7002BKM**	**NX7002BKMB**
100	20	3	2	4	-	-	-	-	57	-	-	-	PHT6NQ10T					
		3.5	2	4	-	-	-	-	200	-	-	-	PHT4NQ10T					
		-	1.3	2.7	-	-	-	2	275	300	-	-	**PMT280ENEA**					
		-	1.3	2.7	-	-	-	2	520	560	-	-	**PMT560ENEA**					
		0.85	2	4	19	13	4.6	-	400	-	-	-			BSH114			
		0.15	1	2.8	3	12	-	-	3500	-	-	-			BSS123			
		0.19	1	-	3	12	-	-	-	5000	-	-			BST82			
		0.52	1	-	3	12	-	-	-	5000	-	-	BSP110					
	30	1.9	2	4	10.5	12.5	7	-	213	-	-	-			PMV213SN			
200	20	0.4	0.8	2.8	6	49	-	-	1600	-	-	-		BSS87				
		0.55	0.4	2	10	45	-	-	1700	-	3000	-	BSP122					
240	20	0.375	0.8	2	6	47	-	-	2800	-	7500	-	BSP89					
250	20	0.35	0.8	2	6	47	-	-	2800	-		-	BSP126					
300	20	0.35	0.8	2	6	46	-	-	3700	-	4800	-	BSP130					

In the spotlight

NX7002BKx – NX7002 ESD-protected 60 V N-channel MOSFET series in several SMD packages

- ESD protection to 2 kV HBM
- Available in single and dual configurations
- Single packages from SOT23 to DFN1006
- Dual packages from SOT363 to DFN1010

MOSFETs

Small-signal MOSFETs

Small-signal MOSFETs single (P-channel)

types in **bold** represent new products

Package												SOT223	SOT89 (SC-62)	SOT457 (SC-74)	SOT23	SOT363 (SC-88)	SOT323 (SC-70)	DFN1006-3 (SOT883)	DFN1006B-3(SOT883B)
Size (mm)												6.5 x 3.5 x 1.65	4.5 x 2.5 x 1.5	2.9 x 1.5 x 1.0	2.9 x 1.3 x 1.0	2.0 x 1.25 x 0.95	2.0 x 1.25 x 0.95	1.0 x 0.6 x 0.48	1.0 x 0.6 x 0.37
P_{tot} (mW)												1700	1300	600	250	300	200	250	250
V_{DS} (V)	V_{GS} (V)	I_D (A)	$V_{GS(th)}$ min (V)	$V_{GS(th)}$ max (V)	t_{on} typ (ns)	t_{off} typ (ns)	Q_G typ (nC)	ESD protection (kV)	R_{DSon} typ (mΩ) @ V_{GS} = 10 V	4.5 V	2.5 V	1.8 V								
20	8	5.7	0.45	0.95	39	122	21	-	-	27	36	57			PMN27UP					
		5.6	0.45	0.95	11	83	14.7	2	-	27	38	50				**PMV27UPE**				
		5.3	0.45	0.95	41	122	14.7	2	-	30	38	51				PMV33UPE				
		5.4	0.45	0.95	34	128	15.5	-	-	34	42	57			PMN34UP	PMV32UP				
		6	0.45	0.95	29	84	15.6	4	-	37	45	59			PMN40UPE					
		4	0.47	0.9	-	-	10.5	3	-	50	57	70			PMN50UPE	PMV50UPE				
		2	0.5	1.1	7	50	6	-	-	100	-	-				NX2301P				
		1.2	0.45	0.95	33	52	3.3	-	-	170	210	280				PMV160UP				
		0.75	0.4	-	6.5	65	-	-	-	180	-	420				**BSH205G2**				
		1.4	0.45	0.95	9	35	1.3	1.8	-	330	420	520						PMZ350UPE	PMZB350UPE	
		0.48	0.5	1.3	48	152	0.76	2	-	670	1200	1800							PMZB670UPE	
		0.5	0.45	0.95	2.3	13.5	1.19	1	-	1020	1270	1700						PMZ950UPE	PMZB950UPE	
	12	4.4	0.75	1.25	-	-	-	2	-	26	-	-				**PMV30XPEA**				
		5.7	0.75	1.25	37	66	15	2	-	27	39	-			PMN27XPE					
		5.7	0.75	1.25	44	60	11.5	2	-	41	56	-			PMN42XPE					
		4.1 / 3.5	0.75	1.25	24	84	8.5	-	-	48	71	-			PMN48XP	PMV48XP				
		4.4	0.47	0.9	7	135	7.7	-	-	48	60	82				**PMV50XP**				
		3.9	0.55	0.95	28	101	7.6	-	-	65	90	-				PMV65XP				
		3.3	0.75	1.25	7	36	5	2	-	67	99	-				**PMV65XPE**				
		4.1	0.75	1.25	20	57	5.2	2	-	70	101	-			PMN70XPE					
		3.2	0.47	0.9	6	120	5	-	-	77	95	120				**PMV75UP**				
		3.2	0.45	1	20	170	5	-	-	80	95	120			PMN80XP					
		2	0.65	1.15	48	64	4.8	-	-	90	125	-					PMG85XP			
		2.2	0.75	1.25	-	-	-	2	-	93	-	-				**PMV100XPEA**				
		1	0.65	1.15	26	44	2.6	-	-	175	240	-						PMF170XP		
30	8	1	0.45	0.95	2.9	22	1.45	2	-	400	480	600							PMZ320UPE	PMZB320UPE
		0.47	0.4	-	6.5	65	-	-	-	660	-	1100				BSH203				
		0.23	0.6	1.1	49	103	0.55	2	-	2800	5300	-				NX3008PBK		NX3008PBKW	NX3008PBKM	NX3008PBKMB
	20	4	1	3	6	38	18	3	23	39	-	-				**PMV50EPEA**				
		3	1	2.8	20	50	-	-	220	330	-	-		BSP250						
		0.52	1	-	6.5	65	-	-	630	890	-	-				BSH202				
40	20	1.8	1	2.5	10	40	4.7	1	180	220	-	-				PMV250EPEA				
50	20	0.2	1.1	2.1	24	73	0.26	1	5300	6000	-	-				BSS84AK		BSS84AKW	BSS84AKM	BSS84AKMB
60	20	2.2	1	3	-	-	-	2	99	110	-	-				**PMV100EPEA**				
		0.9	1	3	-	-	-	2	217	241	-	-				**PMV240EPEA**				
		0.3	1	-	6.5	65	-	-	2100	-	2700	-				BSH201				
70	20	2.3	1	3	-	-	-	2	156	177	-	-		**PMT200EPEA**						
200	20	0.225	0.8	2.8	5	20	-	-	10000	-	-	-		BSP220						
240	20	0.2	0.8	2.8	5	20	-	-	10000	-	-	-			BSS192					
250	20	0.225	0.8	2.8	5	10	-	-	10000	-	-	-		BSP225						
300	20	0.21	1.95	2.8	5	15	-	-	17000	-	-	-		BSP230						

Small-signal MOSFET–Schottky combination

Package												DFN2020-6
Size (mm)												2.0 x 2.0 x 0.65
P_{tot} (mW)												1250
Configuration	V_{DS} (V)	V_{GS} (V)	I_D (A)	$V_{GS(th)}$ min (V)	$V_{GS(th)}$ max (V)	t_{on} typ (ns)	t_{off} typ (ns)	Q_G typ (nC)	I_F (A)	V_R (V)	V_F typ. (mV)	R_{DSon} typ (mΩ) @ V_{GS} = 4.5 V	2.5 V	1.8 V	
Single + Schottky	20	8	3.7	0.4	1	20	170	5.7	2	30	455	80	95	120	PMFPB8040XP
			3.7	0.4	1	20	170	5.7	2.2	30	325	80	95	120	PMFPB8032XP

In the spotlight

PMV75UP – 20 V, 77 mΩ P-channel MOSFET

- Cross of Si2301 types
- Low-voltage gate drive with VGSth = 0.68 V (typ)
- Industry-standard SOT23 package
- R_{DSon} specified to 1.8 V for low drive voltages

Small-signal MOSFETs

Small-signal MOSFETs dual

types in **bold** represent new products

Package										SOT363 (SC-88)	SOT666	DFN2020-6 (SOT1118)	DFN1010B-6 (SOT1216)
													
Size (mm)										2.0 x 1.25 x 0.95	1.6 x 1.2 x 0.55	2.0 x 2.0 x 0.65	1.0 x 1.0 x 0.37
P_{tot} (mW)										300	300	1250	350
Polarity	V_{DS} (V)	V_{GS} (V)	I_D (A)	$V_{GS(th)}$ min (V)	$V_{GS(th)}$ max (V)	t_{on} typ (ns)	t_{off} typ (ns)	Q_G typ (nC)	ESD protection (kV)	R_{DSon} typ (mΩ) @ V_{GS} = 10 V	4.5 V	2.5 V	1.8 V				
N-channel	20	8	0.8	0.5	0.95	10	117	0.45	2	-	290	420	600		PMDT290UNE		
			5.8	0.4	1	6	13	3.1	-	-	30	39	56				
			0.6	0.45	0.95	5.6	19	0.4	1	-	470	620	845				PMDXB600UNE
			5.1	0.4	1	6	20	2	-	-	40	53	82				
		12	5.3	0.4	0.9	4	40	14.4	-	-	32	40	60			PMDPB30XN	
	30	8	0.35	0.6	1.1	26	88	0.52	2	-	1000	1400	2000	NX3008NBKS	NX3008NBKV		**NX3008NBKXB**
		12	4	0.5	1.5	8	12	1.9	2	-	55	86	-			**PMDPB56XNE**	
			3.1	0.5	1.5	6	18	1.65	1.8	-	95	130	-			**PMDPB95XNE2**	
			1	0.5	1.5	6.5	14	0.7	2	-	170	240	-	PMGD175XNE			
		20	0.18	0.8	1.5	10	51	0.34	Yes	2700	3000	4000	-	NX3020NAKS	NX3020NAKV		
	60	20	0.36	0.9	1.5	5	13	0.72	-	900	1000	-	-	BSS138PS			
			0.32	0.48	1.6	10	58	0.6	1.5	1000	1100	1400	-	BSS138BKS			
			0.17	1.1	2.1	12	34	0.33	Yes	3000	3700	-	-	NX7002AKS			
			-	0.45	0.95	-	-	-	2	3200	3700	-	-	**NX7002BKS**			**NX7002BKXB**
P-channel	20	8	0.55	0.5	1.3	48	152	0.76	2	-	670	1200	1800		PMDT670UPE		
			4.5	0.45	0.95	7	41	6.3	2	-	58	74	97			PMDPB58UPE	
			0.5	0.45	0.95	2.3	13.5	1.19	1	-	1020	1270	1700				PMDXB950UPE
			3.7	0.45	0.95	6	47	5.4	2	-	82	107	142			PMDPB85UPE	
		12	-	0.75	1.25	-	-	-	2	-	44	60	-			PMDPB42XPE	
			4.5	0.47	0.9	4	135	16.5	-	-	55	75	110			PMDPB55XP	
			4.2	0.75	1	7	33	5	2	-	66	98	-			PMDPB70XPE	
			3.7	0.4	1	6	120	5.7		-	80	95	120			PMDPB80XP	
	30	8	0.2	0.6	1.1	49	103	0.55	2	-	2800	5300	-	NX3008PBKS	NX3008PBKV		**NX3008PBKXB**
		12	3.8	0.45	1	3	112	5.2	-	-	70	89	-			PMDPB70XP	
	50	20	0.16	1.1	2.1	24	73	0.26	1	4500	5700	-	-	BSS84AKS	BSS84AKV		

Small-signal MOSFETs complementary

Package	Type	Polarity	V_{DS} (V)	V_{GS} (V)	I_D (A)	V_{GSth} min (V)	V_{GSth} max (V)	t_{on} typ (ns)	t_{off} typ (ns)	Q_G typ (nC)	ESD protection (kV)	R_{DSon} typ (mΩ) @ V_{GS} = 10 V	4.5 V	2.5 V	1.8 V	1.5 V	1.2 V
 **SOT666** (1.6 x 1.2 x 0.55)	NX1029X	N	60	20	0.33	1.1	2.1	11	19	0.5	2	1000	1300	-	-	-	-
		P	50	20	0.17	1.1	2.1	24	73	0.26	1	4500	5100	-	-	-	-
	NX3008CBKV	N	30	8	0.4	0.6	1.1	26	88	0.52	2	-	1000	1400	2000	-	-
		P	30	8	0.22	0.6	1.1	49	103	0.55	2	-	2800	5300	-	-	-
	PMDT290UCE	N	20	8	0.8	0.5	0.95	10	117	0.45	2	-	290	420	600	-	-
		P	20	8	0.55	0.5	1.3	48	152	0.76	2	-	670	1200	1800	-	-
 **SOT363 (SC-88)** (2.0 x 1.25 x 0.95)	NX3008CBKS	N	30	8	0.35	0.6	1.1	26	88	0.52	2	-	1000	1400	2000	-	-
		P	30	8	0.2	0.6	1.1	49	103	0.55	2	-	2800	5300	-	-	-
 **DFN1010B-6** (1.1 x 1.0 x 0.37)	PMCXB900UE	N	20	8	0.6	0.45	0.95	5.6	19	0.4	1	-	470	620	845	1125	2210
		P	20	8	0.5	0.45	0.95	2.3	13.5	1.19	1	-	1020	1270	1700	2300	3500
 **DFN2020-6** (2.0 x 2.0 x 0.65)	PMCPB5530X	N	20	12	5.3	0.4	0.9	19	56	14.4	-	-	26	33	50	-	-
		P	20	12	4.5	0.47	0.9	18	56	16.5	-	-	55	75	110	-	-

4 steps select a power MOSFET

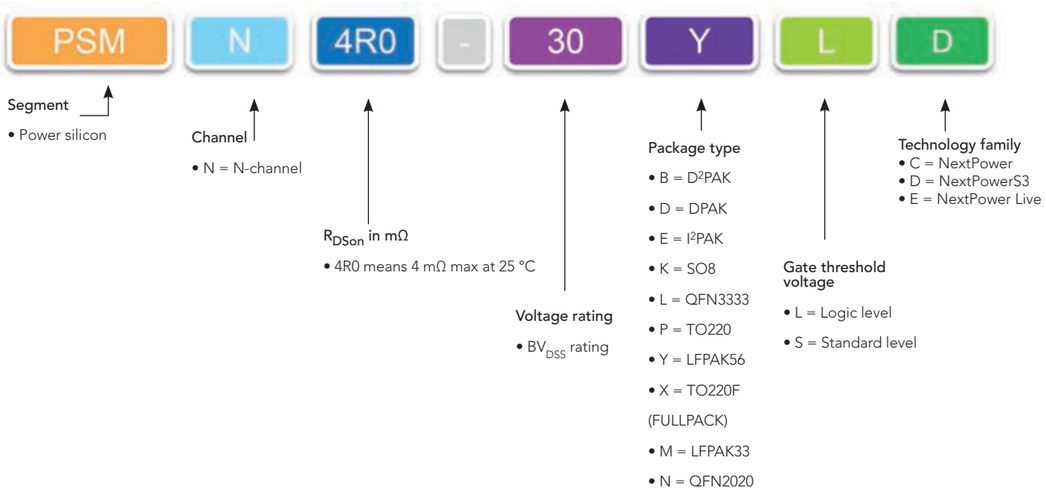
1 Select a voltage, e.g. 40 V

2 Select a package, e.g. LFPAK56

3 Choose an R_{DSon} from our extensive range

4 Select a type and visit www.nxp.com/mosfets to download datasheets and models, and order samples

PSMN part numbering



High-performance power MOSFETs

MOSFET package selection

Through-hold

TO220
- Industry standard
- Up to 150 A

TO220F
- Industry standard
- Up to 75 A

I²PAK
- Industry standard
- Up to 120 A

Surface-mount

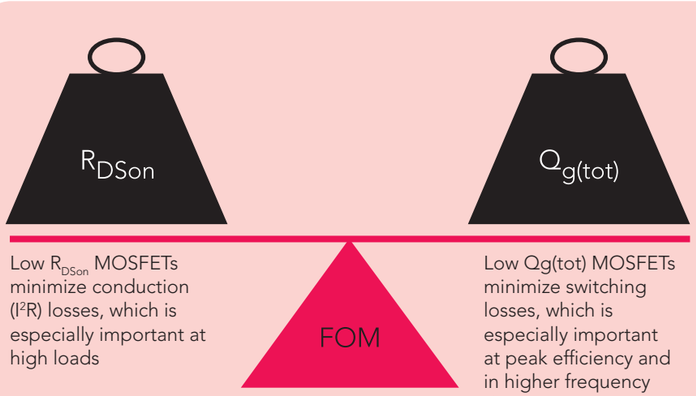
LFPAK56
- Power SO8
- Up to 100 A

LFPAK33
- QFN/DFN3333 compatible
- Up to 70 A

D²PAK
- Industry standard
- Up to 120 A

Featured product: NextPowerS3

NextPowerS3 – perfectly balanced for DC/DC switching applications



The challenge

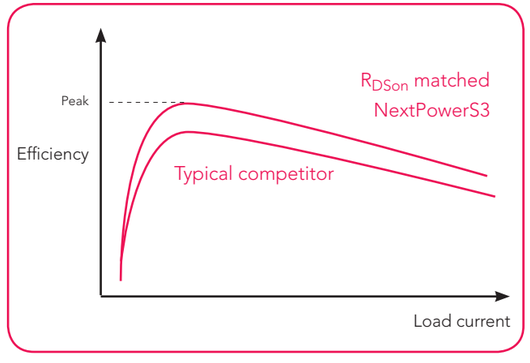
Low R_{DSon} MOSFETs typically need a big die.

Low $Q_{g(tot)}$ MOSFETs typically need a small die.

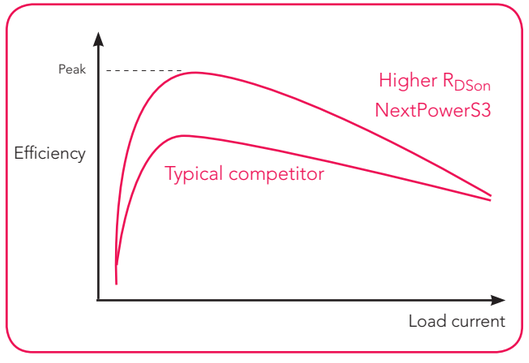
The challenge for manufacturers is to create optimized power MOSFETS that have both low R_{DSon} and low $Q_{g(tot)}$.

Welcome to NextPowerS3.

The Figure of Merit (FOM) of a MOSFET is calculated as the product of the R_{DSon} and $Q_{g(tot)}$. A low FOM indicates good MOSFET performance in switching applications.



Comparing the performance of a NextPowerS3 MOSFET with a competitor of similar R_{DSon} typically shows an efficiency performance advantage across the load range. Since conduction losses are the same for both devices, the advantage is more noticeable at lower loads where switching losses contribute proportionally more.



Using a NextPowerS3 MOSFET, with a higher R_{DSon} than a competitor device, reduces the $Q_{g(tot)}$ still further, resulting in an improved peak efficiency. At higher loads, increased conduction losses cancel out the switching advantages and the two parts show similar performance.

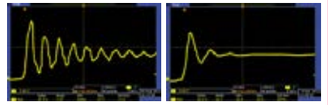
Featured product: NextPowerS3

High switching frequencies

Increasing switching frequency from 300 KHz to 1 MHz allows a 70 - 80% reduction in inductor size. NextPowerS3's excellent switching performance enables such design choices with minimal loss of efficiency.

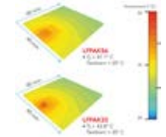
Low spiking

Typical competitor NextPowerS3



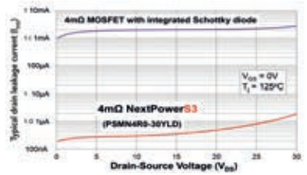
Thanks to optimised output capacitance, body diode and channel structure, NextPowerS3 MOSFETs exhibit "soft-recovery" switching behaviour, resulting in lower voltage spikes, faster decays and virtually no gate glitches.

Thermal efficiency



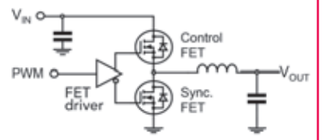
Packaged in the copper-clip based LFPAK package, NextPowerS3 features excellent thermal performance. As R_{DSon} rises with temperature, keeping MOSFETs cool helps efficiency as well as reliability.

Low leakage



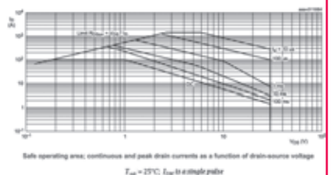
Unique SchottkyPlus technology offers the benefits of an integrated Schottky diode without the problems associated with leakage current.

Specialist high sides



The NextPowerS3 portfolio contains devices with multiple busbars and low R_g optimized for use as control FETs, further improving system efficiencies.

Improved SOA



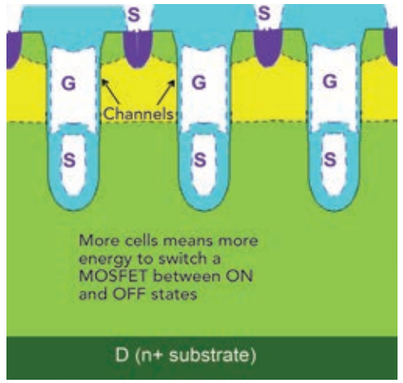
A wide cell pitch makes NextPowerS3 an excellent choice for hot-swap, e-Fuse, and power OR-ing applications.

Package	Type number	V_{DS} [max] (V)	R_{DSon} [max] @ V_{GS} = 10 V (mΩ)	R_{DSon} [max] @ V_{GS} = 4.5 V (mΩ)	I_D [max] (A)	$Q_{G(tot)}$ [typ] (nC)
LFPAK33 (SOT1210)	30MLD	30	2.4	3.2	70	16
	PSMN4R2-30MLD	30	4.3	5.7	70	9.2
	PSMN7R5-30MLD	30	7.6	10.3	57	5.8
Power-SO (LFPAK56)	**PSMN0R9-30YLD**	**30**	**0.87**	**1.09**	**100**	**51**
	PSMN1R0-30YLD	**30**	**1.02**	**1.3**	**100**	**38**
	PSMN1R2-30YLD	**30**	**1.24**	**1.6**	**100**	**32**
	PSMN1R4-30YLD	**30**	**1.42**	**1.85**	**100**	**27.6**
	PSMN2R4-30YLD	30	2.4	3.1	100	18
	PSMN3R0-30YLD	30	3.1	4	100	14.5
	PSMN4R0-30YLD	30	4	5.5	95	9.6
	PSMN6R0-30YLD	30	6	8.35	66	6.7
	PSMN6R1-30YLD	30	6	8.35	66	6.8
	PSMN7R5-30YLD	30	7.5	10.2	51	5.8
	PSMN1R0-40YLD	**40**	**1.1**		**100**	**54**
	PSMN1R4-40YLD	**40**	**1.4**		**100**	**45**

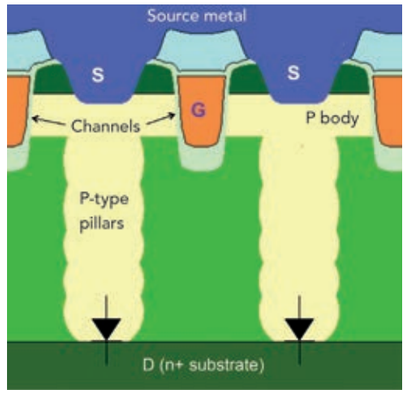
Types in **bold red** represent new products

Featured product: NextPowerS3 – the technology

Typical competitor



NextPowerS3



The importance of cell design

The outstanding performance of NextPowerS3 is largely attributable to NXP's unique "Super-junction" technology and optimization of cell structures.

Most manufacturers of low-voltage MOSFETs use "Split Gate" technology to achieve low R_{DSon}.

NextPowerS3 uses a different approach to its cell design.

The drive for R_{DSon}

A MOSFET's R_{DSon} is given by the formula:
$R_{DSon} = R_{channel} + R_{drift} + R_{substrate} + (R_{package})$
Many manufacturers focus on reducing $R_{channel}$ to drive R_{DSon} down.

NXP's Super-junction allows for an optimization of all three components for reduction in R_{DSon}, while also enhancing switching performance and Safe Operating Area (SOA).

Maximizing switching performance

Switching losses result from the energy required to charge / discharge all the cell capacitances across the device. The total charge required is referred to as $Q_{g(tot)}$.

With NextPower S3, $Q_{g(tot)}$ is lower and switching losses are kept to a minimum. This is especially beneficial at peak efficiency and in higher-frequency designs, which have a higher number of switching events.

SOA and other benefits

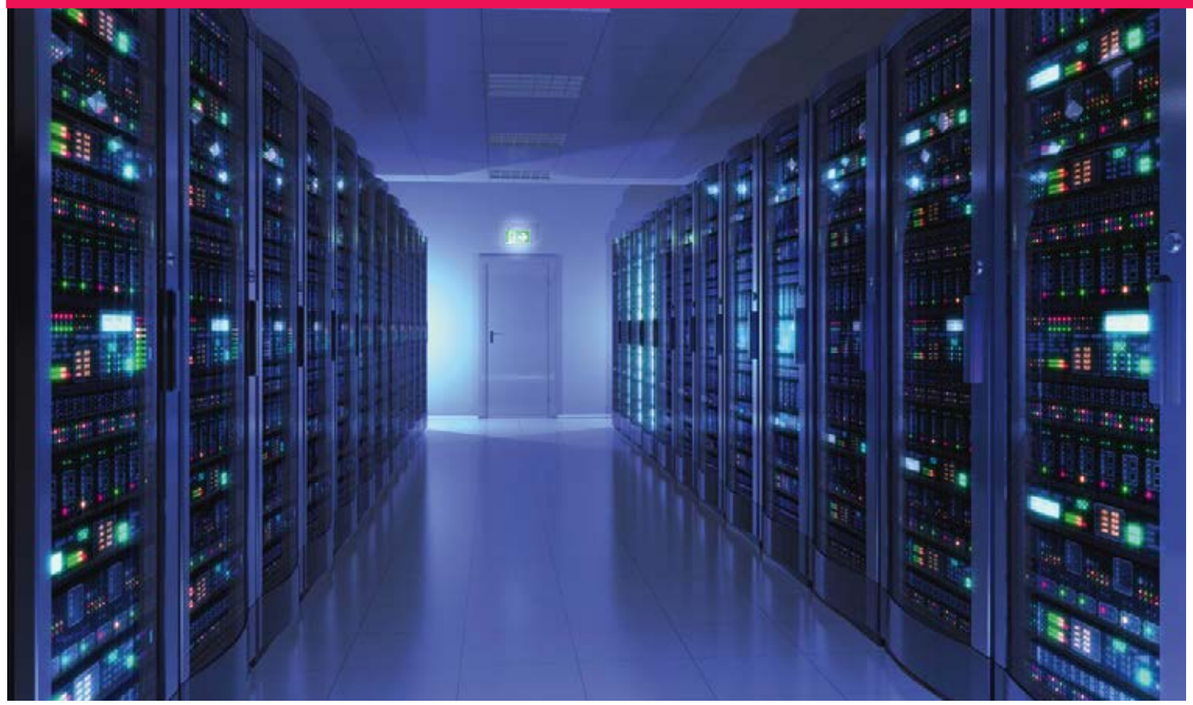
When a device is operating in its linear mode, the channel current generates localized heating effects, which can cause failure.

NXP has optimized the cell structure to keep this heating effect under control. As a result, NextPowerS3 enjoys a particularly strong SOA, which is important in hot-swap, e-Fuse, and power OR-ing designs.

Reverse recovery and diode leakage in SMPS
www.nxp.com/quicklearning33

NextPowerS3 MOSFETs for DC/DC buck regulators
www.nxp.com/quicklearning32

Featured product: NextPower Live



NextPower Live! MOSFETs for a non-stop world

Reliable linear-mode performance AND low R_{DSon} efficiency in "hot-swap" and "soft-start" applications

Non-stop applications

- Cloud computing
- Network storage
- Communications infrastructure
- Industrial process control
- Transaction processing
- Traffic monitoring & signaling
- CCTV security

Non-stop equipment

- Blade and rack servers
- Routers, switches & base stations
- RAID arrays
- Industrial PCs
- Programmable Logic Controllers (PLCs)
- CCTV digital video recorders
- "Hot-swap" & "soft-start" systems

Featured product: NextPower Live

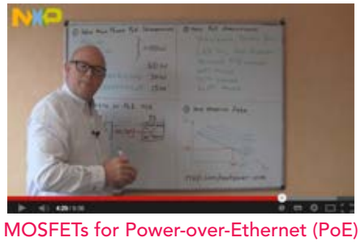
Mobile phones, ATMs, the internet, traffic signals – so much of our daily life depends on 24/7/365 computers, communications, and storage, made possible by rack-based systems that can be maintained with the power on. NextPower Live MOSFETs are designed specifically for such applications:

- When a replacement board is plugged into a live system, it is important that the in-rush current is carefully controlled, so as to protect the components on the board and ensure that other parts of the system experience no power disruption. This application requires MOSFETs with strong linear mode performance and a wide safe operating area (SOA) to manage current effectively and reliably.
- Once the replacement board is safely installed, the MOSFET is turned fully ON. In this mode of operation, a low R_{DSon} is of primary importance, helping to keep temperatures low while maximizing system efficiency.
- Only NextPower Live MOSFETs offer reliable linear mode performance **AND** low R_{DSon} efficiency.

NextPower Live portfolio

Package	30 V for 12 V supplies used in computing applications	100 V for 48 V supplies used in computing telecommunications
D^2PAK (SOT404) 	PSMN1R5-30BLE PSMN3R4-30BLE	PSMN4R8-100BSE PSMN7R6-100BSE
TO220 		PSMN4R8-100PSE PSMN7R8-100PSE
LFPAK56 (Power-SO8) 	PSMN2R0-30YLE	PSMN013-100YSE
LFPAK33 		(specifically for PoE applications) PSMN040-100MSE PSMN075-100MSE

Power MOSFET operation in linear mode
www.nxp.com/quicklearning34



MOSFETs for Power-over-Ethernet (PoE) PSE applications
www.nxp.com/quicklearning36

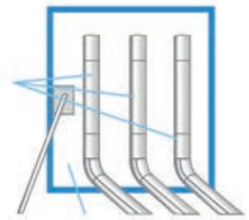
Next Power Live! MOSFETs for HOT SWAP and Power over Ethernet
www.nxp.com/quicklearning29

Featured product: NextPower Cordless

- Battery-powered tools, including everything from small engraving devices and screwdrivers to heavy-duty saws and agricultural tools, present a wide variety of requirements for driving the motor. The MOSFETs used in these systems have to perform at demanding levels and must have:
- Low on-resistance for optimum battery life
- Low thermal resistance for reduced junction temperature (for greater reliability)
- High current capability (when the motor stalls, for example)
- Choice of logic- and standard-level gate drives, depending on battery voltage
- Excellent avalanche ruggedness to withstand high-load conditions
- Environmental robustness (wide operating/storage temperatures, harsh vibrations)
- Competitive cost

Overall, the motor-control MOSFET needs to deliver automotive-grade performance at a commercially competitive price

Typical Power Tools MOSFET internal construction



NXP has developed a range of MOSFETs specifically aimed at motor-control applications. These are based on our highly reliable, automotive-qualified silicon, with specific package enhancements such as thicker wires and multiple bond points (“stitch bonding”) to spread the current evenly over the die surface.

NXP’s long history in automotive MOSFETs means we have the know-how to produce devices with excellent avalanche ruggedness. The same expertise deployed in power steering and ABS systems worldwide is put to use in our devices for motor control and that means performance you can count on.

Max current (I_D[max]) depends largely on the number and diameter of the aluminium bond wires. The NXP Power Tools portfolio is typically based on a standard of three 500 µm wires, allowing for an I_D[max] rating of up to 150 A in a TO220 package.

Single-shot avalance ruggedness
www.nxp.com/quicklearning35

NextPower Cordless MOSFETs for battery-powered tools
www.nxp.com/quicklearning28

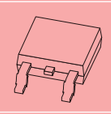
NextPower Cordless portfolio

Type number	V_{DS} [max] (V)	R_{DSon} [max] @ V_{GS} = 10 V (mΩ)	R_{DSon} [max] @ V_{GS} = 4.5 V (mΩ)	I_D [max] (A)	EAS at rated current [mJ]	Package	Gate theshold
PSMN2R0-30YL	30	2	2.63	100	151	LFPAK56	Logic Level
PSMN2R0-30YLE	30	2	3.5	100	370	LFPAK56	Logic Level
PSMN2R5-30YL	30	2.4	3.16	100	103	LFPAK56	Logic Level
PSMN2R6-30YLC	30	2.8	3.65	100	50	LFPAK56	Logic Level
PSMN1R9-40PL	40	1.7	1.94	150	1008	TO220 (SOT78)	Logic Level
PSMN2R1-40PL	40	2.2	2.6	150	622	TO220 (SOT78)	Logic Level
PSMN1R5-40PS	40	1.6	-	120	1400	TO220 (SOT78)	Standard Level
PSMN2R2-40PS	40	2.1	-	100	1240	TO220 (SOT78)	Standard Level
PSMN2R5-60PL	60	2.6	3.15	150	655	TO220 (SOT78)	Logic Level
PSMN2R6-60PS	60	2.9	-	150	519	TO220 (SOT78)	Standard Level
PSMN3R3-60PL	60	3.4	3.8	130	404	TO220 (SOT78)	Logic Level
PSMN3R9-60PS	60	3.9	-	130	372	TO220 (SOT78)	Standard Level
PSMN4R2-60PL	60	4.3	4.3	130	372	TO220 (SOT78)	Logic Level
PSMN7R6-60PS	60	7.8	-	92	110	TO220 (SOT78)	Standard Level

For the most current product information go to www.nxp.com/mosfets (updated daily!)

Heavy-duty tools with large batteries require MOSFETs that withstand higher currents. NXP's TO-220 NextPower Cordless devices handle up to 150A. The high-reliability LFPAK56 is ideal for smaller tools and space-constrained applications.

Power MOSFETs 20 - 25 V

Package	Type number	V_{DS} [max] (V)	R_{DSon} [max] @ V_{GS} = 10 V (mΩ)	R_{DSon} [max] @ V_{GS} = 4.5 V (mΩ)	I_D [max] (A)	$Q_{G(tot)}$ [typ] (nC)
LFPAK56; Power-SO8 (SOT669) 	PH3120L	20	2.65	3.7	100	48.5
	PH2520U	20		2.7	100	78
	PSMN0R9-25YLC	25	0.99	1.25	100	51
	PSMN1R1-25YLC	25	1.15	1.5	100	39
	PSMN1R2-25YL	25	1.2	1.85	100	50.6
	PSMN1R2-25YLC	25	1.3	1.7	100	31
	PSMN1R5-25YL	25	1.5	2.2	100	36
	PSMN2R2-25YLC	25	2.4	3.15	100	18
	PSMN2R9-25YLC	25	3.15	4.1	100	16
	PSMN4R0-25YLC	25	4.5	5.8	84	10.9
	PSMN6R0-25YLB	25	6.1	7.9	73	9
	PSMN6R5-25YLC	25	6.5	8.5	64	8.4
	PH2925U	25		3	100	92
LFPAK33 (SOT1210) 	PSMN2R8-25MLC	25	2.8	3.75	70	16.3
	PSMN3R9-25MLC	25	4.15	5.55	70	9.7
	PSMN9R0-25MLC	25	8.65	11.3	55	5.4
D²PAK (SOT404) 	PHB66NQ03LT	25	10.5		66	12
DPAK (SOT428) 	PHD38N02LT	20			44.7	15.1
	PHD97NQ03LT	25	6.3	10.6	75	11.7
SO8 (SOT96-1) 	PSMN006-20K	20		5	32	32

For the most current product information go to www.nxp.com/mosfets (updated daily!)

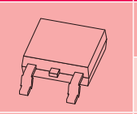
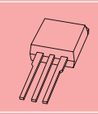
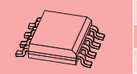
Power MOSFETs 30 V – Part 1

Package	Type number	V_{DS} [max] (V)	R_{DSon} [max] @ V_{GS} = 10 V (mΩ)	R_{DSon} [max] @ V_{GS} = 4.5 V (mΩ)	I_D [max] (A)	$Q_{G(tot)}$ [typ] (nC)
LFPAK56; Power-SO8 (SOT669) 	PSMN0R9-30YLD	30	0.87	1.09	100	51
	PSMN1R0-30YLD	30	1.02	1.3	100	38.2
	PSMN1R0-30YLC	30	1.15	1.4	100	50
	PSMN1R2-30YLD	30	1.24	1.6	100	32
	PSMN1R2-30YLC	30	1.25	1.65	100	38
	PSMN1R3-30YL	30	1.3	1.95	100	46.6
	PSMN1R4-30YLD	30	1.42	1.85	100	27.6
	PSMN1R5-30YL	30	1.5	1.9	100	36.2
	PSMN1R5-30YLC	30	1.55	2.05	100	30
	PSMN1R7-30YL	30	1.7	2.1	100	36.2
	PSMN2R0-30YL	30	2	2.63	100	30
	PSMN2R0-30YLE	30	2	3.5	100	87
	PSMN2R2-30YLC	30	2.15	2.8	100	26
	PSMN2R4-30YLD	30	2.4	3.1	100	18
	PSMN2R5-30YL	30	2.4	3.16	100	27
	PSMN2R6-30YLC	30	2.8	3.65	100	18
	PSMN3R0-30YL	30	3	4.04	100	21
	PSMN3R0-30YLD	30	3.1	4	100	14.5
	PSMN3R2-30YLC	30	3.5	4.55	100	14.2
	PSMN3R5-30YL	30	3.5	4.61	100	19
	PSMN4R0-30YL	30	4	5.25	100	17.6
	PSMN4R0-30YLD	30	4	5.5	95	9.6
	PSMN4R1-30YLC	30	4.35	5.7	92	11
	PSMN4R5-30YLC	30	4.8	6.1	84	9.6
	PSMN5R0-30YL	30	5	6.7	91	14.1
	PSMN6R0-30YL	30	6	7.87	79	11
	PSMN6R0-30YLD	30	6	8.35	66	6.7
	PSMN6R1-30YLD	30	6	8.35	66	6.4
	PSMN6R0-30YLB	30	6.5	8.1	71	9
	PSMN7R0-30YL	30	7	9.1	76	10
	PSMN7R0-30YLC	30	7.1	8.9	61	7.9
	PSMN7R5-30YLD	30	7.5	10.2	51	5.8
	PSMN9R1-30YL	30	9.1	13.6	57	8.4
	PSMN9R5-30YLC	30	9.8	12.1	44	5
	PSMN011-30YLC	30	11.6	14.5	37	4.9
	PSMN013-30YLC	30	13.6	16.9	32	4
LFPAK33 (SOT1210) 	PSMN2R4-30MLD	30	2.4	3.2	70	16
	PSMN2R9-30MLC	30	2.95	3.8	70	16.7
	PSMN3R0-30MLC	30	3.15	4.05	70	16.1
	PSMN4R2-30MLD	30	4.3	5.7	70	9.2
	PSMN4R4-30MLC	30	4.65	6	70	10.6
	PSMN7R0-30MLC	30	7	9	67	8.2
	PSMN7R5-30MLD	30	7.6	10.3	57	5.8
	PSMN9R8-30MLC	30	9.8	12.4	50	5
	PSMN013-30MLC	30	13.6	16.9	39	3.7
	PSMN020-30MLC	30	18.1	27	31.8	4.6
D²PAK (SOT404) 	PSMNR90-30BL	30	1	1.4	120	118
	PSMN1R5-30BLE	30	1.5	1.85	120	228
	PSMN1R8-30BL	30	1.8	2.1	100	83
	PSMN1R6-30BL	30	1.9	2.2	100	101
	PSMN2R0-30BL	30	2.1	2.9	100	55
	PSMN2R7-30BL	30	3	3.7	100	32
	PSMN3R4-30BL	30	3.3	3.8	100	31
	PSMN3R4-30BLE	30	3.4	5	120	81
	PSMN4R3-30BL	30	4.1	5.2	100	19
	PSMN017-30BL	30	17	23.3	32	5.1
	PSMN022-30BL	30	22.6	29.6	30	4.4

For the most current product information go to www.nxp.com/mosfets (updated daily!)

Power MOSFETs 30 V – Part 2

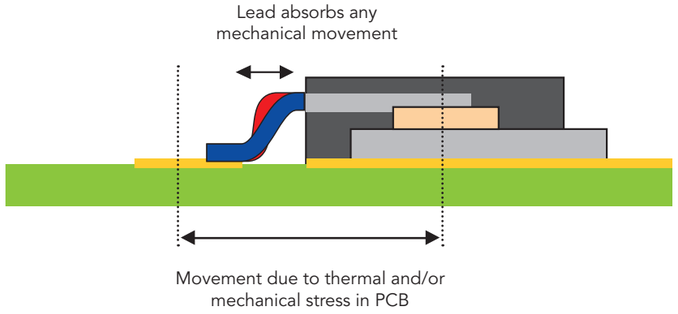
types in **bold** represent new products

Package	Type number	V_{DS} [max] (V)	R_{DSon} [max] @ V_{GS} = 10 V (mΩ)	R_{DSon} [max] @ V_{GS} = 4.5 V (mΩ)	I_D [max] (A)	$Q_{G(tot)}$ [typ] (nC)
DPAK (SOT428) 	PHD101NQ03LT	30	5.5		75	23
	PHD71NQ03LT	30	10		75	13.2
TO-220AB (SOT78) 	PSMN1R1-30PL	30	1.3	1.6	120	118
	PSMN1R6-30PL	30	1.7	2.1	100	101
	PSMN1R8-30PL	30	1.8	2.3	100	83
	PSMN2R0-30PL	30	2.1	2.8	100	55
	PSMN2R7-30PL	30	2.7	3.6	100	32
	PSMN3R4-30PL	30	3.4	4.1	100	31
	PSMN4R3-30PL	30	4.3	6.2	100	19
	PHP36N03LT	30	17	22	43.4	18.5
	PSMN017-30PL	30	17	23.4	32	5.1
	PSMN022-30PL	30	22	34	30	4.4
I²PAK (SOT226) 	PSMN1R1-30EL	30	1.3	1.6	120	118
	PSMN017-30EL	30	17	23.4	32	5.1
SO8 (SOT96-1) 	PHK31NQ03LT	30	4.4	5.6	30.4	33
	PSMN005-30K	30	5.5	8		34
	PHK18NQ03LT	30	8.9	12.5	20.3	10.6
	PHK13N03LT	30	20	26	13.8	10.7
	PHK12NQ03LT	30		14	11.8	

For the most current product information go to www.nxp.com/mosfets (updated daily!)

LFPAK for mechanical and thermal ruggedness

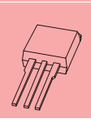
NXP LFPAK



LFPAK pins provide compliance while allowing for thermal expansion due to temperature differences between the MOSFET and the PCB, and allowing for mechanical strain due to PCB bending and flexing

Power MOSFETs 40 V

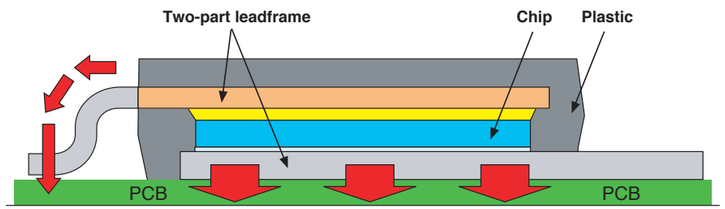
types in **bold** represent new products

Package	Type number	V_{DS} [max] (V)	R_{DSon} [max] @ V_{GS} = 10 V (mΩ)	R_{DSon} [max] @ V_{GS} = 4.5 V (mΩ)	I_D [max] (A)	$Q_{G(tot)}$ [typ] (nC)
LFPAK56; Power-SO8 (SOT669) 	PSMN1R0-40YLD	40	1.1	1.4	100	59
	PSMN1R4-40YLD	40	1.4	1.85	100	45
	PSMN1R6-40YLC	40	1.55	1.8	100	59
	PSMN1R8-40YLC	40	1.8	2.1	100	45
	PSMN2R6-40YS	40	2.8		100	63
	PSMN3R3-40YS	40	3.3		100	49
	PH4840S	40	4.1		94.5	67
	PSMN4R0-40YS	40	4.2		100	38
	PSMN5R8-40YS	40	5.7		90	28.8
	PSMN8R3-40YS	40	8.6		70	20
	PSMN014-40YS	40	14		46	12
D²PAK (SOT404) 	PSMN1R1-40BS	40	1.3		120	136
	PSMN2R2-40BS	40	2.2		100	130
	PSMN2R8-40BS	40	2.9		100	71
	PSMN4R5-40BS	40	4.5		100	35
	PSMN8R0-40BS	40	7.6		77	21
TO-220AB (SOT78) 	PSMN1R5-40PS	40	1.6		150	136
	PSMN1R9-40PL	40	1.7	1.94	150	230
	PSMN2R1-40PL	40	2.2	2.6	150	168.9
	PSMN2R2-40PS	40	2.1		100	110
	PSMN2R8-40PS	40	2.8		100	71
	PSMN4R5-40PS	40	4.6		100	35
	PSMN8R0-40PS	40	7.6		77	17
I²PAK (SOT226) 	PSMN1R5-40ES	40	1,6		120	136

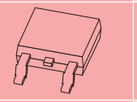
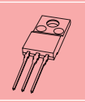
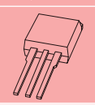
For the most current product information go to www.nxp.com/mosfets (updated daily!)

Power-SO8 (LFPAK) Design

- Low thermal resistance
- Low electrical resistance
- Low inductance



Power MOSFETs 55 - 60 V

Package	Type number	V_{DS} [max] (V)	R_{DSon} [max] @ V_{GS} = 10 V (mΩ)	I_D [max] (A)	$Q_{G(tot)}$ [typ] (nC)
LFPAK56; Power-SO8 (SOT669) 	PH955L	55	8.3	62.5	42
	PSMN5R5-60YS	60	5.2	100	56
	PSMN7R0-60YS	60	6.4	89	45
	PSMN8R5-60YS	60	8	76	39
	PSMN012-60YS	60	11.1	59	28.4
	PSMN017-60YS	60	15.7	44	20
	PSMN030-60YS	60	24.7	29	13
LFPAK33 (SOT1210) 	PSMN011-60ML	60	11.3	61	37.2
	PSMN011-60MS	60	11.3	61	23
D²PAK (SOT404) 	PHB191NQ06LT	55	3.7	75	95.6
	PHB21N06LT	55	70	19	
	PHB20N06T	55	75	20.3	11
	PSMN1R7-60BS	60	2	120	137
	PSMN3R0-60BS	60	3.2	100	130
	PSMN004-60B	60	3.6	75	168
	PSMN4R6-60BS	60	4.4	100	70.8
	PSMN7R6-60BS	60	7.8	92	38.7
	PSMN015-60BS	60	14.8	50	20.9
	PHB32N06LT	60	37	34	17
DPAK (SOT428) 	PHD20N06T	55	77	18	11
TO-220AB (SOT78) 	PHP191NQ06LT	55	3.7	75	95.6
	PHP20N06T	55	75	20.3	11
	PSMN2R0-60PS	60	2.2	120	137
	PSMN2R5-60PL	60	2.6	150	223
	PSMN2R6-60PS	60	2.6	150	140
	PSMN3R0-60PS	60	3	100	130
	PSMN3R3-60PL	60	3.4	130	175
	PSMN3R9-60PS	60	3.9	130	103
	PSMN4R2-60PL	60	3.9	130	151
	PSMN4R6-60PS	60	4.6	100	70.8
	PSMN7R6-60PS	60	7.8	92	38.7
	PSMN015-60PS	60	14.8	50	20.9
TO-220F (SOT186A) 	PSMN3R9-60XS	60	4	75	103
I²PAK (SOT226) 	PSMN2R0-60ES	60	2.2	120	137
	PSMN3R0-60ES	60	3	100	130

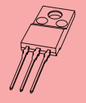
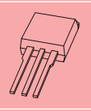
For the most current product information go to www.nxp.com/mosfets (updated daily!)

Power MOSFETs 75 - 80 V

Package	Type number	V_{DS} [max] (V)	R_{DSon} [max] @ V_{GS} = 10 V (mΩ)	I_D [max] (A)	$Q_{G(tot)}$ [typ] (nC)
LFPAK56; Power-SO8 (SOT669) 	PSMN8R2-80YS	80	8.5	82	55
	PSMN011-80YS	80	11	67	45
	PSMN013-80YS	80	12.9	60	37
	PSMN018-80YS	80	18	45	26
	PSMN026-80YS	80	27.5	34	20
	PSMN041-80YL	80	41	25	21.9
	PSMN045-80YS	80	45	24	12.5
D²PAK (SOT404) 	PSMN005-75B	75	5	75	165
	PSMN008-75B	75	8.5	75	122.8
	PHB110NQ08T	75	9	75	113.1
	PHB29N08T	75		27	19
	PSMN2R8-80BS	80	3	120	139
	PSMN3R3-80BS	80	3.5	120	111
	PSMN4R4-80BS	80	4.5	100	125
	PSMN5R0-80BS	80	5.1	100	101
	PSMN6R5-80BS	80	6.9	100	71
	PSMN8R7-80BS	80	8.7	90	52
	PSMN012-80BS	80	11	74	36
	PSMN017-80BS	80	17	50	26
	PSMN050-80BS	80	46	22	11
TO-220AB (SOT78) 	PSMN005-75P	75	5	75	165
	PHP79NQ08LT	75	16	73	30
	PHP29N08T	75		27	19
	PSMN3R3-80PS	80	3.3	120	139
	PSMN3R5-80PS	80	3.5	120	139
	PSMN4R4-80PS	80	4.1	100	112
	PSMN4R3-80PS	80	4.3	120	111
	PSMN5R0-80PS	80	4.7	100	87
	PSMN6R5-80PS	80	6.9	100	71
	PSMN8R7-80PS	80	8.7	90	52
	PSMN012-80PS	80	11	74	36
	PSMN017-80PS	80	17	50	26
I²PAK (SOT226) 	PSMN3R3-80ES	80	3.3	120	139
	PSMN3R5-80ES	80	3.5	120	139
	PSMN4R3-80ES	80	4.3	120	111

For the most current product information go to www.nxp.com/mosfets (updated daily!)

Power MOSFETs 100 V

Package	Type number	V_{DS} [max] (V)	R_{DSon} [max] @ V_{GS} = 10 V (mΩ)	I_D [max] (A)	$Q_{G(tot)}$ [typ] (nC)
LFPAK56; Power-SO8 (SOT669) 	PSMN012-100YS	100	12	60	64
	PSMN013-100YSE	100	13	82	75
	PSMN016-100YS	100	16.3	51	54
	PSMN020-100YS	100	20.5	43	41
	PH20100S	100	23	34.3	39
	PSMN028-100YS	100	27.5	42	33
	PSMN038-100YL	100	37.5	30	21.6
	PSMN039-100YS	100	39.5	28.1	23
	PSMN069-100YS	100	72.4	17	14
LFPAK33 (SOT1210) 	PSMN040-100MSE	100	36.6	30	30
	PSMN075-100MSE	100	71	18	16.4
D²PAK (SOT404) 	PSMN3R8-100BS	100	3.9	120	170
	PSMN4R8-100BSE	100	4.8	120	196
	PSMN5R6-100BS	100	5.6	100	141
	PSMN7R0-100BS	100	6.8	100	125
	PSMN7R6-100BSE	100	7.6	75	128
	PSMN009-100B	100	8.8	75	156
	PSMN9R5-100BS	100	9.6	89	82
	PSMN013-100BS	100	13.9	68	59
	PSMN015-100B	100	15	75	90
	PSMN016-100BS	100	16	57	49
	PHB45NQ10T	100	25	47	61
	PSMN027-100BS	100	26.8	37	30
	PHB47NQ10T	100	28	47	66
	PSMN034-100BS	100	34.5	32	23.8
	PHB27NQ10T	100	50	28	30
	PHB18NQ10T	100	90	18	21
DPAK (SOT428) 	PSMN025-100D	100	25	47	61
TO-220AB (SOT78) 	PSMN4R3-100PS	100	4.3	120	170
	PSMN5R0-100PS	100	5	120	170
	PSMN5R6-100PS	100	5.6	100	141
	PSMN7R0-100PS	100	6.8	100	125
	PSMN8R5-100PS	100	8.5	100	111
	PSMN009-100P	100	8.8	75	156
	PSMN9R5-100PS	100	9.6	89	82
	PSMN013-100PS	100	13.9	68	59
	PSMN015-100P	100	15	75	90
	PSMN016-100PS	100	16	57	49
	PHP45NQ10T	100	25	47	61
	PSMN027-100PS	100	26.8	37	30
	PSMN034-100PS	100	34.5	32	23.8
	PHP18NQ10T	100	90	18	21
TO-220F (SOT186A) 	PSMN4R6-100XS	100	4.6	70.4	153
	PSMN5R0-100XS	100	5	67.5	153
	PSMN5R6-100XS	100	5.6	61.8	145
	PSMN7R0-100XS	100	6.8	55	121
	PSMN8R5-100XS	100	8.5	49	100
	PSMN9R5-100XS	100	9.6	44.2	81.5
	PSMN013-100XS	100	13.9	35.2	57.5
	PSMN016-100XS	100	16	32.1	46.2
	PSMN027-100XS	100	26.8	23.4	30
I²PAK (SOT226) 	PSMN4R3-100ES	100	4.3	120	170
	PSMN5R0-100ES	100	5	120	170
	PSMN7R0-100ES	100	6.8	100	125
	PSMN8R5-100ES	100	8.5	100	111
	PSMN013-100ES	100	13.9	68	59
SC-73 (SOT223) 	PHT6NQ10T	100	90	6.5	21
	PHT4NQ10T	100	250	3.5	7.4
SO8 (SOT96-1) 	PSMN038-100K	100	38		43
	PHKD3NQ10T	100	90	3	21

For the most current product information go to www.nxp.com/mosfets (updated daily!)

Power MOSFETs 105 - 150 V

Package	Type number	V_{DS} [max] (V)	R_{DSon} [max] @ V_{GS} = 10 V (mΩ)	I_D [max] (A)	$Q_{G(tot)}$ [typ] (nC)
LFPAK56; Power-SO8 (SOT669)	PSMN059-150Y	150	59	43	27.9
D²PAK (SOT404)	PSMN030-150B	150	30	55.5	98
	PSMN035-150B	150	35	50	79
	PHB45NQ15T	150	42	45.1	32
DPAK (SOT428)	PSMN063-150D	150	63	29	55
TO-220AB (SOT78)	PHP45NQ11T	105	25	47	60
	PSMN015-110P	110	15	75	90
	PHP27NQ11T	110	50	27.6	30
	PHP23NQ11T	110	70	23	22
	PHP18NQ11T	110	90	18	21
	PSMN6R3-120PS	120	6.7	70	207.1
	PSMN7R8-120PS	120	7.9	70	167
	PSMN030-150P	150	30	55.5	98
	PSMN035-150P	150	35	50	79
	PHP30NQ15T	150	63	29	55
	PHP28NQ15T	150	65	28.5	24
I²PAK (SOT226)	PSMN6R3-120ES	120	6.7	70	207.1
	PSMN7R8-120ES	120	7.9	70	167
SO8 (SOT96-1)	PHK5NQ15T	150	75	5	29
	PSMN085-150K	150	85		40

For the most current product information go to www.nxp.com/mosfets (updated daily!)

P-channel

Package	Type number	V_{DS} [max] (V)	R_{DSon} [max] @ V_{GS} = 10 V (mΩ)	R_{DSon} [max] @ V_{GS} = 4.5 V (mΩ)	I_D [max] (A)	$Q_{G(tot)}$ [typ] (nC)
SO8 (SOT96-1)	PMK30EP	-30	19	30	-14.9	50
	PMK35EP	-30	19	35	-14.9	42
	PHP225	-30	250	400	-	10
	PMK50XP	-20	-	50	-7.9	10
	PHK04P02T	-16	-	120	-4.66	7.2

For the most current product information go to www.nxp.com/mosfets (updated daily!)

Multi-chip

Package	Type number	Channel type	V_{DS} [max] (V)	R_{DSon} [max] @ V_{GS} = 10 V (mΩ)	I_D [max] (A)	$Q_{G(tot)}$ [typ] (nC)
SO8 (SOT96-1)	PHP225	P	-30	250	-	10
	PHKD6N02LT	N	20	-	10.9	15.3
	PHKD13N03LT	N	30	20	10.4	10.7
	PHN203	N	30	30	6.3	14.6
	PHN210T	N	30	100	3.4	6
	PHC21025	N/P	30	250	-	10
	PHKD3NQ10T	N	100	90	3	21
	PHC2300	N/P	300	6000	-	6.24

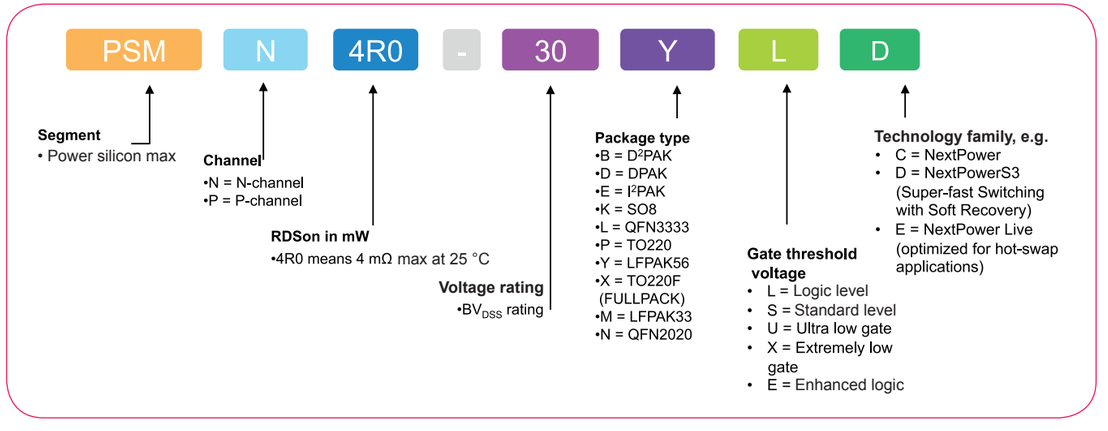
For the most current product information go to www.nxp.com/mosfets (updated daily!)

Power MOSFETs 200 V

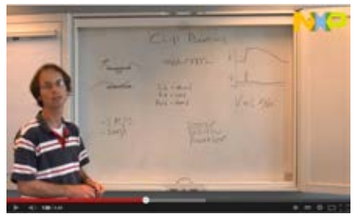
Package	Type number	V_{DS} [max] (V)	R_{DSon} [max] @ V_{GS} = 10 V (mΩ)	I_D [max] (A)	$Q_{G(tot)}$ [typ] (nC)
LFPAK56; Power-SO8 (SOT669)	PSMN102-200Y	200	102	21.5	30.7
D²PAK (SOT404)	PSMN057-200B	200	57	39	96
	PSMN070-200B	200	70	35	77
	PHB33NQ20T	200	77	32.7	32.2
	PHB20NQ20T	200	130	20	65
DPAK (SOT428)	PSMN130-200D	200	130	20	65
	PHD9NQ20T	200	400	8.7	24
TO-220AB (SOT78)	PSMN057-200P	200	57	39	96
	PSMN070-200P	200	70	35	77
	PHP33NQ20T	200	77	32.7	32.2
	PHP20NQ20T	200	130	20	65
	PHP9NQ20T	200	400	8.7	24
SO8 (SOT96-1)	PSMN165-200K	200	165	-	40

For the most current product information go to www.nxp.com/mosfets (updated daily!)

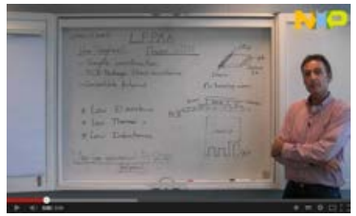
PSMN part numbering



Quick learning videos



Introduction to clip-bonding technology
www.nxp.com/quicklearning1



Introducing NXP LFPAK
www.nxp.com/quicklearning5

LFPAK Power-SO8 vs. DPAK
www.nxp.com/quicklearning18

NextPower Cordless MOSFETs for battery-powered tools
www.nxp.com/quicklearning28

Next Power Live! MOSFETs for HOT SWAP and Power over Ethernet
www.nxp.com/quicklearning29

NextPowerS3 MOSFETs for DC/DC buck regulators
www.nxp.com/quicklearning32

Reverse recovery and diode leakage in SMPS
www.nxp.com/quicklearning33

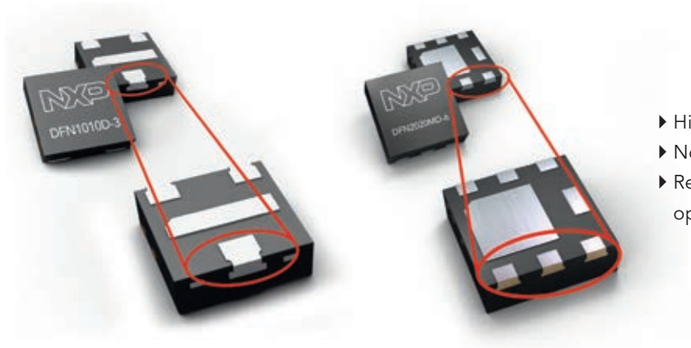
Power MOSFET operation in Linear Mode
www.nxp.com/quicklearning34

Single-shot avalance ruggedness
www.nxp.com/quicklearning35

MOSFETs for Power-over-Ethernet (PoE) PSE applications
www.nxp.com/quicklearning36

Small-signal MOSFETs for automotive

DFN1010 and DFN2020 with solderable side pads



- High-quality solder connections
- No complete wetting on side pad
- Reduction of production costs through optical visual solder inspection

Comparison of solder capability

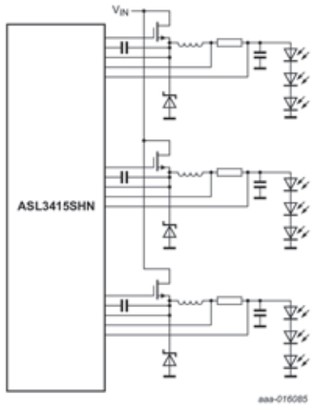
NXP package
100% solderable side pads

100% solder wetting solution
with new 2 x 2 mm leadless package DFN2020MD-6

Packages from other suppliers

- Quality of solder connection difficult to determine
- Very limited options for optical solder inspection

Reference design for LED lighting



In the spotlight

PMPB85ENEA - Automotive-compliant 60 V N-channel MOSFET with I_D max of 4.4 A in DFN2020MD-6 (SOT1220)

60 V N-channel with R_{DSon} of typ. 72mΩ @ V_{GS} = 10 V
Small and leadless ultrathin SMD plastic package: 2.0 x 2.0 x 0.65 mm
Exposed drain pad for excellent thermal conduction
ESD protection to 2 kV HBM
AEC-Q101 qualified

Automotive MOSFETs

Automotive-compliant small-signal MOSFETs

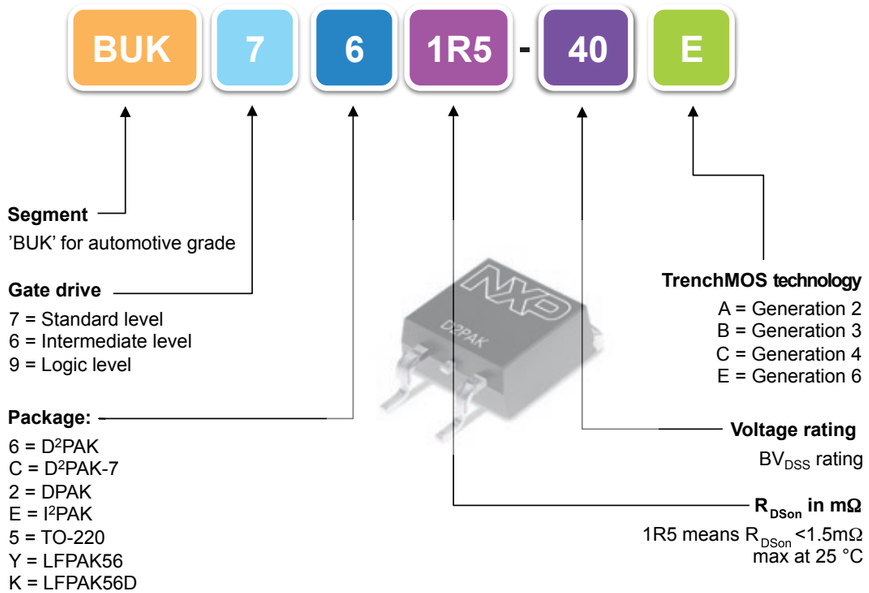
types in **bold** represent new products

Package														SOT223	SOT457 (SC-74)	SOT23	SOT363 (SC-88)	SOT323 (SC-70)	SOT666	DFN2020MD-6 (SOT1220)	DFN1010D-3 (SOT1215)	DFN1006 (SOT883)
Size (mm)														6.5 x 3.5 x 1.65	2.9 x 1.5 x 1.0	2.9 x 1.3 x 1.0	2.0 x 1.25 x 0.95	2.0 x 1.25 x 0.95	1.6 x 1.2 x 0.55	2.0 x 2.0 x 0.65	1.1 x 1.0 x 0.37	1.0 x 0.6 x 0.5
Ptot (mW)														1700	600	250	300	200	300	1250	1000	250
Polarity	Configuration	V_{DS} (V)	V_{GS} (V)	I_D (A)	$V_{GS(th)}$ min (V)	$V_{GS(th)}$ max (V)	t_{on} typ (ns)	t_{off} typ (ns)	Q_G typ (nC)	ESD protection (kV)	R_{DSon} typ (mΩ) @ V_{GS} = 10 V	4.5 V	2.5 V	1.8 V										
N-channel	Single	20	8	5.2	0.5	1.5	12	128	6.4	2	-	24	28	72			**PMV28UNEA**							
			12	5.9	0.75	1.25	16	49	31	2	-	14	20	-			**PMV20XNEA**							
		30	8	0.4	0.6	1.1	26	88	0.52	2	-	1000	1400	2000			NX3008NBK		NX3008NBKW				
			20	4.9	1	2.5	9.9	29	20	2.8	15	21	-	-			**PMV25ENEA**							
				3.7	1	2.5	-	-	-	1.6	-	-	-	-			**PMV50ENEA**							
				1.9	1	2.5	5.4	12	5.4	1.6	54	74	-	-			**PMV100ENEA**							
		40	20	2.5	1	2.5	14	14	2.4	1	95	120	-	-			PMV130ENEA							
		60	20	12.9	1	3	9	12	12.1	-	34	40	-	-							PMPB40SNA			
				-	1.3	2.7	-	-	-	2	44	52	-	-							**PMPB55ENEA**			
				2.8	1	2.5	9	33	19	2.8	46	52	-	-			**PMV55ENEA**							
				3	1.3	2.7	4	10.5	6.2	2.7	72	85	-	-							PMPB85ENEA			
				1.9	1	2.5	-	-	-	2	-	-	-	-			**PMV120ENEA**							
				1.4	1	2.5	-	-	-	2	-	-	-	-			**PMV230ENEA**							
				0.7	1	2.5	-	-	-	2.5	-	-	-	-			**PMV450ENEA**							
				0.36	0.9	1.5	5	13	0.72	-	900	1000	-	-			BSS138P		BSS138PW					
				0.36	0.48	1.6	10	58	0.6	1.5	1000	1100	1400	-			BSS138BK		BSS138BKW					
				0.3	1	2.5	11	19	0.5	2	1000	1300	-	-			2N7002BK		2N7002BKW					2N7002BKM
				0.3	1	2.5	16	60	1.09	3	1100	1300	-	-			2N7002CK							
				0.2	0.8	1.5	5	36	0.39	Yes	2700	3000	4000	-			BSS138AKA							
		80	20	1.9	1.3	2.7	3.5	9.5	4.8	2	175	195	-	-							PMPB215ENEA			
				2.8	1.3	2.7	5	15	9.9	2.8	80	92	-	-							**PMPB95ENEA**			
				1.1	1.3	2.7	2	9	3	2	345	390	-	-								PMXB360ENEA		
		100	20	-	1.3	2.7	-	-	-	2	275	300	-	-	**PMT280ENEA**									
				-	1.3	2.7	-	-	-	2	520	560	-	-	**PMT560ENEA**									
	Dual	20	8	0.8	0.5	0.95	10	117	0.45	2	-	380	620	1100						PMDT290UNE				
		30	8	0.4	0.6	1.1	26	88	0.52	2	-	1000	1400	2000				NX3008NBKS		NX3008NBKV				
		60	20	0.3	1	2.5	11	19	0.5	2	1000	1300	-	-				2N7002BKS						
				0.36	0.48	1.6	10	58	0.6	1.5	1000	1100	1400	-				BSS138BKS						
				0.36	0.9	1.5	5	13	0.72	-	900	1000	-	-				BSS138PS						
P-channel	Single	20	8	6	0.45	0.95	8	50	15.6	4	-	37	45	59		**PMN40UPEA**								
				2	0.5	1.1	7	50	6	-	-	100	155	210			NX2301P							
			12	5.7	0.75	1.25	15	37	15	2	-	27	39	-		**PMN27XPEA**								
				5.7	0.75	1.25	17	33	11.5	2	-	41	56	-		**PMN42XPEA**								
				4.4	0.75	1.25	-	-	-	2	-	26	-	-			**PMV30XPEA**							
				3.5	0.75	1.25	11	61	8.5	-	-	48	71	-			**PMV48XPA**							
				4.1	0.75	1.25	15	51	8.7	-	-	48	72	-		**PMN48XPA**								
				3.3	0.75	1.25	7	36	5	2	-	67	99	-			**PMV65XPEA**							
				4.1	0.75	1.25	7	40	5.2	2	-	70	101	-		**PMN70XPEA**								
				2.2	0.75	1.25	-	-	-	2	-	93	-	-			**PMV100XPEA**							
		30	8	0.23	0.6	1.1	49	103	0.55	2	-	2800	5300	-			NX3008PBK		NX3008PBKW					
			20	4	1	3	6	38	18	3	23	39	-	-			**PMV50EPEA**							
		40	20	1.5	1	2.5	4	26	4.7	1	180	220	-	-			PMV250EPEA							
		50	20	0.2	1.1	2.1	24	73	0.26	1	5300	6000	-	-			BSS84AK		BSS84AKW					BSS84AKM
		60	20	2.2	1	3	-	-	-	2	99	110	-	-			**PMV100EPEA**							
				0.9	1	3	-	-	-	2	217	241	-	-			**PMV240EPEA**							
		70	20	2.3	1	3	-	-	-	2	156	177	-	-	**PMT200EPEA**									
	Dual	20	8	0.55	0.5	1.3	48	152	0.76	2	-	670	1200	1800						PMDT670UPE				
		30	8	0.2	0.6	1.1	49	103	0.55	2	-	2800	5300	-				NX3008PBKS		NX3008PBKV				
		50	20	0.16	1.1	2.1	24	73	0.26	1	5300	6000	-	-				BSS84AKS		BSS84AKV				
N	Compl	20	8	0.73	0.5	0.95	10	117	0.45	2	-	290	420	600				PMGD290UCEA						
P		20	8	0.5	0.5	1.3	48	152	0.76	2	-	670	1200	1800										

4 steps to select an automotive MOSFET

1. Select a voltage, e.g. 40 V
2. Select a package, e.g D^2PAK
3. Choose an R_{DSon} from our extensive range
4. Select a 'BUK' type and visit www.nxp.com/automotivemosfets to download datasheets and models, and order samples

Automotive-grade MOSFET product numbering



High-performance automotive MOSFETs

MOSFET package selection

Through-hold

TO220
- Industry standard
- 120 A

I²PAK
- Industry standard
- 120 A

Surface-mount

Premium performance

D²PAK-7
- Highest performance
- 190 A

D²PAK
- Industry standard
- 120 A

Space saving

LFPAK56
- PowerSO8
- 100 A

LFPAK56D
- Dual Power-SO8
- 40 A per channel

DPAK
- Industry standard
- Proven reliability
- 100 A

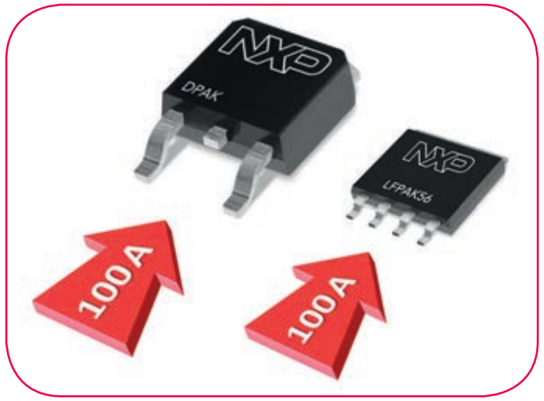
SOT223
- Industry standard
- Proven reliability

All packages are automotive AEC-Q101 qualified to 175 °C and RoHs compliant

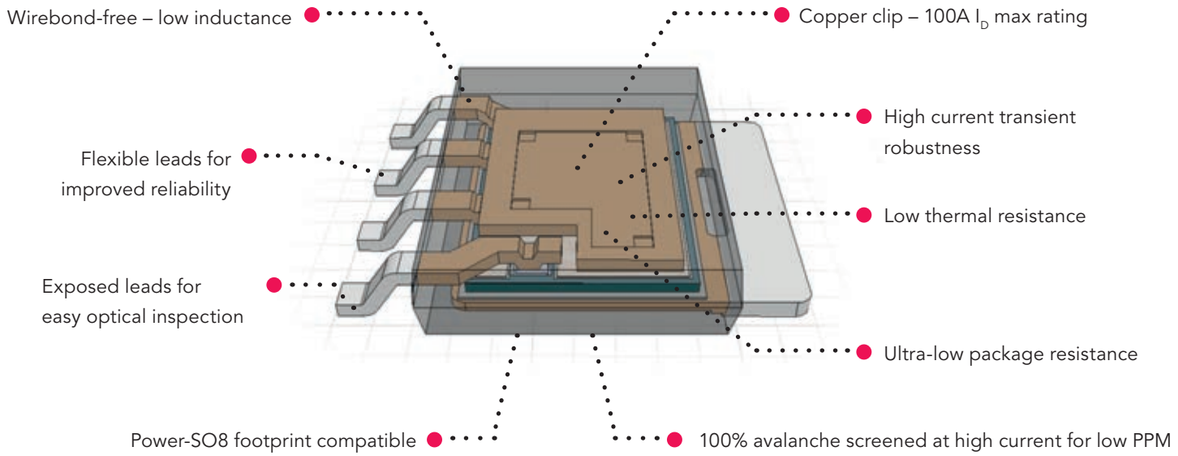
LFPAK56

LFPAK56 – the Power-SO8 that packs a punch

Providing a true alternative to DPAK, NXP's LFPAK56 portfolio gives industry-leading performance in a truly iinnovative, automotive-grade package. Saving a considerable amount of space compared to traditional DPAK solutions, the LFPAK56 offers designers flexibility and reliability without compromising thermal performance.



Fully AEC-Q101 qualified to 175 °C

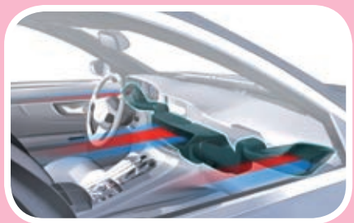


POWERTRAIN

- Engine management
- Gearbox / clutch
- Engine fan
- Fuel / water pump
- Auxiliary valves

CHASSIS & SAFETY

- Vertical stability (ESP)
- Braking systems (ABS)
- Airbag
- Electric Parking Brake (EPB)



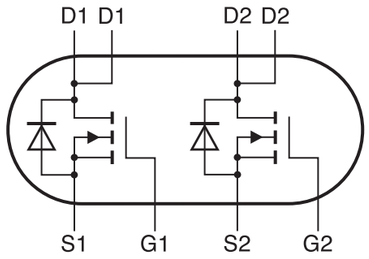
BODY & SECURITY

- Body control module
- Climate control (HVAC)
- Wiper systems
- Electric windows
- Electric mirrors
- Electric seats
- Sunroof
- Lighting

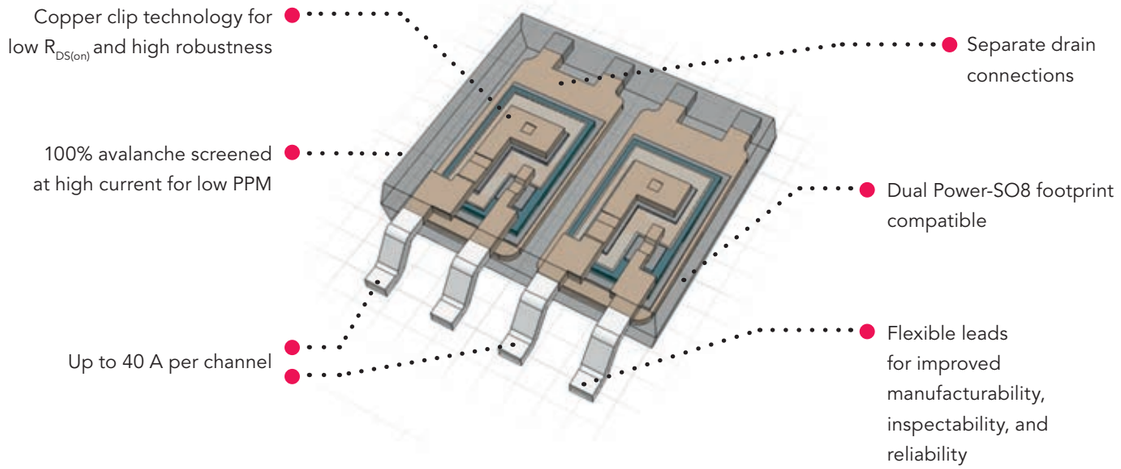
LFPAK56D

LFPAK56D – the ultimate dual MOSFET

Packing even more into the Power-SO8 footprint, the LFPAK56D fits two MOSFETs into one robust package without compromising on performance. NXP's cutting-edge copper-clip technology allows for exceptional current handling, ultra-low package resistance, and supreme robustness and reliability. Perfect for situations where space is at a premium, the LFPAK56D offers power performance.



Fully AEC-Q101 qualified to 175 °C



LFPAK56D footprint comparison

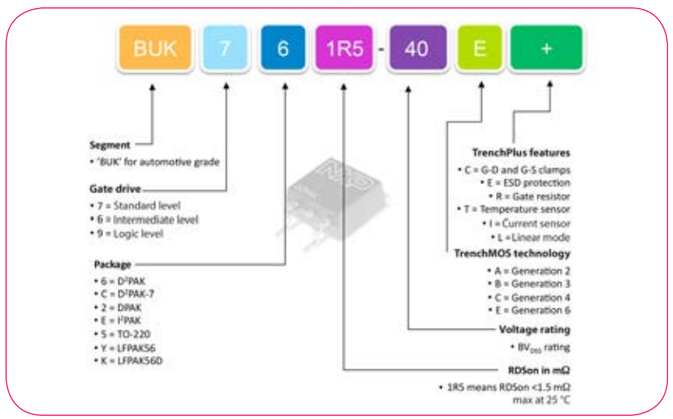
Product	Pad layout	Footprint area
		31 mm²
		62 mm²
		140 mm²

30 V N-channel automotive TrenchMOS

Package name	Type number	V_{DS} [max] [V]	R_{DSon} [max] @ 10 V [mΩ]	R_{DSon} [max] @ 5 V [mΩ]	I_D [max] @ 25 °C [A]	$R_{th(j-mb)}$ [max] [K/W]
LFPAK56; Power-SO8 (SOT669)	BUK9Y07-30B	30	6	7	75	1.42
	BUK7Y07-30B	30	7		75	1.42
	BUK9Y11-30B	30	9	11	59	2
	BUK7Y10-30B	30	10		67	1.76
	BUK9Y22-30B	30	19	22	37.7	2.53
	BUK7Y20-30B	30	20		39.5	2.53
LFPAK56D (SOT1205)	BUK7K5R1-30E	30			40	2.21
	BUK7K5R6-30E	30			40	2.36
D²PAK (SOT404)	BUK962R8-30B	30	2.4	2.8	75	0.5
	BUK762R7-30B	30	2.7		75	0.5
	BUK763R4-30B	30	3.4		75	0.59
	BUK9605-30A	30	4.6	5	75	0.65
	BUK9607-30B	30	5	7	75	0.95
	BUK7607-30B	30	7		75	0.95
DPAK (SOT428)	BUK9214-30A	30	12	14	63	1.4
	BUK6213-30A	30	13		55	1.4
TO-220AB (SOT78A)	BUK952R8-30B	30	2.4	2.8	75	0.5
	BUK752R7-30B	30	2.7		75	0.5
	BUK9507-30B	30	5	7	75	0.95
	BUK7507-30B	30	7		75	0.95
I²PAK (SOT226)	BUK7E2R7-30B	30	2.7		75	0.5
	BUK9E04-30B	30	3	4	75	0.59

For the most current product information go to www.nxp.com/mosfets (updated daily!)

Automotive TrenchMOS part numbering



40 V N-channel automotive TrenchMOS – Part 1

Package name	Type number	V_{DS} [max] [V]	R_{DSon} [max] @ 10 V [mΩ]	R_{DSon} [max] @ 5 V [mΩ]	I_D [max] @ 25 °C [A]	$R_{th(j-mb)}$ [max] [K/W]
LFPAK56; Power-SO8 (SOT669)	BUK9Y3R0-40E	40	2.5	3	100	0.77
	BUK7Y3R5-40E	40	3.5		100	0.9
	BUK9Y3R5-40E	40	3.6	3.8	100	0.9
	BUK9Y4R4-40E	40	3.7	4.4	100	1.02
	BUK7Y4R4-40E	40	4.4		100	1.02
	BUK9Y7R6-40E	40	6	7.6	79	1.58
	BUK7Y7R6-40E	40	7.6		79	1.58
	BUK9Y09-40B	40	8	9	75	1.42
	BUK7Y08-40B	40	8		75	1.42
	BUK9Y12-40E	40	10	12	52	2.31
	BUK9Y14-40B	40	11	14	56	1.8
	BUK7Y12-40E	40	12		52	2.31
	BUK7Y13-40B	40	13		58	1.8
	BUK9Y21-40E	40	17	21	33	3.33
	BUK7Y21-40E	40	21		33	3.33
	BUK9Y27-40B	40	24	27	34	2.53
	BUK9Y29-40E	40	25	29	25	4.03
	BUK7Y25-40B	40	25		35.3	2.53
	BUK7Y29-40E	40	29		26	4.03
LFPAK56D (SOT1205)	BUK7K6R2-40E	40	5.8			2.21
	BUK9K6R2-40E	40	6	6.2	40	2.21
	BUK9K6R8-40E	40	6.1	7.2	40	2.36
	BUK7K6R8-40E	40	6.8			2.36
	BUK9K8R7-40E	40	8	9.4	30	2.84
	BUK7K8R7-40E	40	8.5			2.84
	BUK9K18-40E	40	16	19.5	30	3.96
	BUK7K18-40E	40	19		24.2	3.96
	BUK9K25-40E	40	24	29	18.2	4.68
	BUK7K25-40E	40	25			4.68
D²PAK (SOT404)	BUK961R6-40E	40	1.4	1.6	120	0.43
	BUK762R0-40E	40	2		120	0.51
	BUK962R6-40E	40	2.4	2.8	100	0.57
	BUK762R6-40E	40	2.6		100	0.57
	BUK963R1-40E	40	2.7	3.1	100	0.64
	BUK963R2-40B	40	2.8	3.2	100	0.5
	BUK762R9-40E	40	2.9		100	0.64
	BUK763R1-40B	40	3.1		75	0.5
	BUK964R1-40E	40	3.5	4.1	75	0.82
	BUK9604-40A	40	4	4.4	75	0.5

For the most current product information go to www.nxp.com/mosfets (updated daily!)

40 V N-channel automotive TrenchMOS – Part 2

Package name	Type number	V_{DS} [max] [V]	R_{DSon} [max] @ 10 V [mΩ]	R_{DSon} [max] @ 5 V [mΩ]	I_D [max] @ 25 °C [A]	$R_{th(j-mb)}$ [max] [K/W]
D^2PAK (SOT404) 	BUK964R4-40B	40	4	4.4	75	0.59
	BUK764R0-40E	40	4		75	0.82
	BUK965R4-40E	40	4.4	5.4	75	1.09
	BUK7604-40A	40	4.5		75	0.5
	BUK765R3-40E	40	4.9		75	1.09
	BUK9606-40B	40	5	6.4	75	0.74
	BUK765R2-40B	40	5.2		75	0.74
	BUK9609-40B	40	7	9	75	0.95
	BUK768R1-40E	40	7.2		75	1.56
	BUK7608-40B	40	8		75	0.95
	BUK761R6-40E	40	1.57		120	0.43
	BUK761R7-40E	40	1.6		120	0.46
DPAK (SOT428) 	BUK9209-40B	40	7	9	75	0.95
	BUK7208-40B	40	8		75	0.95
TO-220AB (SOT78A) 	BUK751R8-40E	40	1.8		120	0.43
	BUK752R3-40E	40	2.3		120	0.51
	BUK953R2-40B	40	2.8	3.2	100	0.5
	BUK753R1-40E	40	3.1		100	0.64
	BUK9504-40A	40	4	4.4	75	0.5
	BUK954R4-40B	40	4	4.4	75	0.59
	BUK754R3-40B	40	4.3		75	0.59
	BUK9506-40B	40	5	6.4	75	0.74
	BUK755R2-40B	40	5.2		75	0.74
	BUK9509-40B	40	7	9	75	0.95
	BUK758R3-40E	40	7.4		75	1.56
	BUK7508-40B	40	8		75	0.95
I^2PAK (SOT226) 	BUK7E1R8-40E	40	1.8		120	0.43
	BUK7E1R9-40E	40	1.9		120	0.46
	BUK7E2R3-40E	40	2.3		120	0.51
	BUK9E3R2-40B	40	2.8	3.2	100	0.5
	BUK7E3R1-40E	40	3.1		100	0.64
	BUK9E04-40A	40	4	4.4	75	0.5
	BUK9E4R4-40B	40	4	4.4	75	0.59
	BUK7E04-40A	40	4.5		75	0.5
	BUK7E8R3-40E	40	7.4		75	1.56

For the most current produc information go to www.nxp.com/mosfets (updated daily!)

55 - 60 V N-channel automotive TrenchMOS – Part 1

Package name	Type number	V_{DS} [max] [V]	R_{DSon} [max] @ 10 V [mΩ]	R_{DSon} [max] @ 5 V [mΩ]	I_D [max] @ 25 °C [A]	$R_{th(j-mb)}$ [max] [K/W]
LFPAK56; Power-SO8 (SOT669) 	BUK9Y12-55B	55	11	12	61.8	1.42
	BUK7Y12-55B	55	12		61.8	1.42
	BUK9Y19-55B	55	17.3	19	46	1.8
	BUK7Y18-55B	55	18		47.4	1.76
	BUK9Y40-55B	55	36	40	26	2.5
	BUK9Y4R8-60E	60	4.1	4.8	100	0.63
	BUK7Y4R8-60E	60	4.8		100	0.63
	BUK9Y6R0-60E	60	5.2	6	100	0.77
	BUK9Y7R2-60E	60	5.6	7.2	100	0.9
	BUK7Y6R0-60E	60	6		100	0.77
	BUK7Y7R2-60E	60	7.2		100	0.9
	BUK9Y8R7-60E	60	7.5	8.7	86	1.02
	BUK7Y8R7-60E	60	8.7		87	1.02
	BUK9Y15-60E	60	13	15	53	1.58
	BUK7Y15-60E	60	15		53	1.59
	BUK9Y25-60E	60	21.5	25	34	2.31
	BUK7Y25-60E	60	25		34	2.31
	BUK9Y43-60E	60	38	43	22	3.33
	BUK7Y43-60E	60	43		22	3.33
	BUK9Y59-60E	60	52	59	16.7	4.03
	BUK7Y59-60E	60	59		17	4.03
LFPAK56D (SOT1205) 	BUK7K12-60E	60	9.3			2.21
	BUK9K12-60E	60	10.7	11.5	35	2.21
	BUK7K17-60E	60	14			2.84
	BUK9K17-60E	60	15.6	17	26	2.84
	BUK7K35-60E	60	30		20.7	3.96
	BUK9K35-60E	60	32	35	22	3.96
	BUK7K52-60E	60	45		15.4	4.68
	BUK9K52-60E	60	49	55	16	4.68
D^2PAK (SOT404) 	BUK964R2-55B	55	3.7	4.2	75	0.5
	BUK764R0-55B	55	4		75	0.5
	BUK9606-55B	55	5.4	6	75	0.58
	BUK9606-55A	55	5.8	6.3	75	0.5
	BUK7606-55B	55	6		75	0.59
	BUK7606-55A	55	6.3		75	0.5
	BUK9608-55B	55	7	8.4	75	0.74
	BUK7607-55B	55	7.1		75	0.74
	BUK9608-55A	55	7.5	8	75	0.59
	BUK7608-55A	55	8		75	0.59
	BUK9612-55B	55	10	12	75	0.95

For the most current produc information go to www.nxp.com/mosfets (updated daily!)

55 - 60 V N-channel automotive TrenchMOS – Part 2

Package name	Type number	V_{DS} [max] [V]	R_{DSon} [max] @ 10 V [mΩ]	R_{DSon} [max] @ 5 V [mΩ]	I_D [max] @ 25 °C [A]	$R_{th(j-mb)}$ [max] [K/W]
D²PAK (SOT404) 	BUK7610-55AL	55	10		75	0.5
	BUK7611-55A	55	11		75	0.9
	BUK7611-55B	55	11		75	0.95
	BUK9614-55A	55	13	14	73	1
	BUK7614-55A	55	14		73	0.9
	BUK9616-55A	55	15	16	66	
	BUK9620-55A	55	18	20	54	1.2
	BUK7620-55A	55	20		54	1.2
	BUK9624-55A	55	21.7	24	46	1.4
	BUK7624-55A	55	24		47	
	BUK9628-55A	55	25	28	42	1.5
	BUK7628-55A	55	28		42	
	BUK9635-55A	55	32	35	34	1.8
	BUK7635-55A	55	35		35	1.7
	BUK9675-55A	55	68	75	20	2.4
	BUK7675-55A	55	75		20.3	2.4
	BUK962R5-60E	60	2.3	2.5	120	0.43
	BUK762R4-60E	60	2.4		120	0.43
	BUK962R8-60E	60	2.5	2.8	120	0.46
	BUK762R6-60E	60	2.6		120	0.46
	BUK963R3-60E	60	3	3.3	120	0.51
	BUK763R1-60E	60	3.1		120	0.51
	BUK964R2-60E	60	3.9	4.2	100	0.57
	BUK763R9-60E	60	3.9		100	0.57
	BUK964R8-60E	60	4.4	4.8	100	0.64
	BUK764R4-60E	60	4.5		100	0.64
	BUK966R5-60E	60	5.9	6.5	75	0.82
	BUK766R0-60E	60	6		75	0.82
	BUK969R0-60E	60	8	9	75	1.09
	BUK768R3-60E	60	8.3		75	1.09
	BUK9614-60E	60	12.8	14	56	1.56
	BUK7613-60E	60	13		58	1.56
D²PAK-7 (SOT427) 	BUK9C10-55BIT	55	9	10	75	0.78
DPAK (SOT428) 	BUK9212-55B	55	10	12	75	0.95
	BUK7210-55B	55	10		75	0.95
	BUK7212-55B	55	12		75	0.95
	BUK9215-55A	55	13.6	15	62	1.3
	BUK7215-55A	55	15		62	1.3
	BUK9219-55A	55	17.6	19	55	1.3
	BUK7219-55A	55	19		55	1.3
	BUK9222-55A	55	20	22	48	1.5
	BUK9225-55A	55	22	25	43	1.6
	BUK7222-55A	55	22		48	1.5

For the most current product information go to www.nxp.com/mosfets (updated daily!)

Automotive MOSFETs

55 - 60 V N-channel automotive TrenchMOS – Part 3

Package name	Type number	V_{DS} [max] [V]	R_{DSon} [max] @ 10 V [mΩ]	R_{DSon} [max] @ 5 V [mΩ]	I_D [max] @ 25 °C [A]	$R_{th(j-mb)}$ [max] [K/W]
DPAK (SOT428) 	BUK7230-55A	55	30		38	1.7
	BUK9237-55A	55	33	37	32	1.94
	BUK7237-55A	55	37		32.3	1.9
	BUK9245-55A	55	40	45	28	2.1
	BUK9277-55A	55	69	77	18	2.93
	BUK7277-55A	55	77		18	2.9
	BUK92150-55A	55	125	140	11	4.1
	BUK72150-55A	55	150		11	4.1
TO-220AB (SOT78A) 	BUK954R2-55B	55	3.7	4.2	75	0.5
	BUK754R0-55B	55	4		75	0.5
	BUK7506-55A	55	6.3		75	0.5
	BUK9508-55B	55	7	8.4	75	0.74
	BUK7507-55B	55	7.1		75	0.74
	BUK7508-55A	55	8		75	0.59
	BUK7509-55A	55	9		75	0.71
	BUK9511-55A	55	10	11	75	0.9
	BUK9512-55B	55	10	12	75	0.95
	BUK7511-55B	55	11		75	0.95
	BUK9514-55A	55	13	14	73	1
	BUK9518-55A	55	16	18	61	1.1
	BUK7516-55A	55	16		65.7	1.1
	BUK7520-55A	55	20		54	1.2
	BUK9524-55A	55	21.7	24	46	1.4
	BUK7528-55A	55	28		42	1.5
	BUK9535-55A	55	32	35	34	1.8
	BUK7535-55A	55	35		35	1.7
	BUK9575-55A	55	68	75	20	2.4
	BUK7575-55A	55	75		20.3	2.4
	BUK953R5-60E	60	3.4	3.7	120	0.51
	BUK954R8-60E	60	4.5	4.9	100	0.64
I²PAK (SOT226) 	BUK9E06-55B	55	5.4	6	75	0.58
	BUK9E06-55A	55	5.8	6.3	75	0.5
	BUK9E08-55B	55	7	8.4	75	0.74
	BUK7E07-55B	55	7.1		75	0.74
	BUK7E2R6-60E	60	2.6		120	0.43
	BUK7E3R5-60E	60	3.5		120	0.51
	BUK7E4R6-60E	60	4.6		100	0.64
	BUK7E13-60E	60	13		58	1.56
SC-73 (SOT223) 	BUK9832-55A	55	29	32	12	
	BUK9880-55A	55	73	80	7	
	BUK7880-55A	55	80		7	
	BUK98150-55A	55	137	150	5.5	
	BUK78150-55A	55	150		5.5	

For the most current product information go to www.nxp.com/mosfets (updated daily!)

75 - 80 V N-channel automotive TrenchMOS – Part 1

Package name	Type number	V_{DS} [max] [V]	R_{DSon} [max] @ 10 V [mΩ]	R_{DSon} [max] @ 5 V [mΩ]	I_D [max] @ 25 °C [A]	$R_{th(j-mb)}$ [max] [K/W]
LFPAK56; Power-SO8 (SOT669) 	BUK9Y19-75B	75	18	19	48.2	1.42
	BUK7Y18-75B	75	18		49	1.42
	BUK9Y30-75B	75	28	30	34	1.8
	BUK7Y28-75B	75	28		35.5	1.76
	BUK9Y58-75B	75	53	58	20.73	2.53
	BUK7Y7R8-80E	80	7.8		100	0.63
	BUK9Y8R5-80E	80	8	8.5	100	0.63
	BUK7Y9R9-80E	80	9.9		89	0.77
	BUK9Y11-80E	80	10	11	84	0.77
	BUK9Y14-80E	80	14	15	62	1.02
	BUK7Y14-80E	80	14		65	1.02
	BUK9Y25-80E	80	25	27	37	1.58
	BUK7Y25-80E	80	25		39	1.58
	BUK9Y41-80E	80	41	45	24	2.33
	BUK7Y41-80E	80	41		25	2.31
	BUK9Y72-80E	80	72	78	15	3.33
	BUK7Y72-80E	80	72		16	3.33
	BUK9Y107-80E	80	98	107	11.8	4.03
	BUK7Y98-80E	80	98		12.3	4.03
D²PAK (SOT404) 	BUK9606-75B	75	5.5	6.1	75	0.5
	BUK7606-75B	75	5.6		75	0.5
	BUK9609-75A	75	8.5	9	75	0.65
	BUK7609-75A	75	9		75	0.65
	BUK7613-75B	75	13		75	0.95
	BUK9616-75B	75	14	16.4	67	0.95
	BUK9623-75A	75	22	23	53	1.1
	BUK7623-75A	75	23		53	1.1
	BUK763R8-80E	80	3.8		120	0.43
	BUK964R2-80E	80	4	4.2	120	0.43
	BUK764R2-80E	80	4.2		120	0.46
	BUK964R7-80E	80	4.5	4.7	120	0.46
	BUK769R6-80E	80	9.6		75	0.82
	BUK9611-80E	80	10	11	75	0.82

For the most current product information go to www.nxp.com/mosfets (updated daily!)

75 - 80 V N-channel automotive TrenchMOS – Part 2

Package name	Type number	V_{DS} [max] [V]	R_{DSon} [max] @ 10 V [mΩ]	R_{DSon} [max] @ 5 V [mΩ]	I_D [max] @ 25 °C [A]	$R_{th(j-mb)}$ [max] [K/W]
DPAK (SOT428) 	BUK7214-75B	75	14		69	0.95
	BUK9217-75B	75	15	17	64	0.95
	BUK9226-75A	75	24.6	26	45	1.3
	BUK7226-75A	75	26		45	1
TO-220AB (SOT78A) 	BUK9506-75B	75	5.5	6.1	75	0.5
	BUK7506-75B	75	5.6		75	0.5
	BUK7509-75A	75	9		75	0.65
	BUK7513-75B	75	13		75	0.95
	BUK9516-75B	75	14	16.4	67	0.95
	BUK753R8-80E	80	4		120	0.43

For the most current product information go to www.nxp.com/mosfets (updated daily!)

100 V N-channel automotive TrenchMOS – Part 1

types in **bold** represent new products

Package name	Type number	V_{DS} [max] [V]	R_{DSon} [max] @ 10 V [mΩ]	R_{DSon} [max] @ 5 V [mΩ]	I_D [max] @ 25 °C [A]	$R_{th(j-mb)}$ [max] [K/W]
LFPAK56; Power-SO8 (SOT669) 	BUK9Y12-100E	100	11.9	12	85	0.63
	BUK7Y12-100E	100	12		85	0.63
	BUK9Y15-100E	100	14.7	15	69	0.77
	BUK7Y15-100E	100	15		68	0.77
	BUK9Y19-100E	100	18	19	56	0.9
	BUK7Y19-100E	100	19		56	0.9
	BUK9Y22-100E	100	21.5	22	49	1.02
	BUK7Y22-100E	100	22		49	1.02
	BUK9Y38-100E	100	37.5	38	30	1.58
	BUK7Y38-100E	100	38		30	1.58
	BUK9Y53-100B	100	49	53	23	2
	BUK7Y53-100B	100	53		24.8	1.76
	BUK9Y65-100E	100	63.3	65	19	2.31
	BUK7Y65-100E	100	65		19	2.31
	BUK9Y104-100B	100	99	104	14.8	2.53
	BUK7Y102-100B	100	102		15	2.53
	BUK9Y113-100E	100	110	113	12	3.33
	BUK7Y113-100E	100	113		12	3.33
	BUK9Y153-100E	100	146	153	9.4	4.03
	BUK7Y153-100E	100	153		9.4	4.03
LFPAK56D (SOT1205) 	BUK9K29-100E	100	27	29	30	2.21
	BUK9K32-100E	100	31	33	26	2.36
	BUK9K45-100E	100	42	45	21	2.84
	BUK9K89-100E	100	85	89	12.5	3.96
	BUK9K134-100E	100	154	159	8.5	4.68
D²PAK (SOT404) 	BUK765R0-100E	100	5		120	0.43
	BUK965R8-100E	100	5.6	5.8	120	0.43
	BUK768R1-100E	100	8.1		100	0.57
	BUK969R3-100E	100	8.9	9.3	100	0.57
	BUK9610-100B	100	9.7	10	75	0.5
	BUK7610-100B	100	10		75	0.5
	BUK7613-100E	100	13		72	0.82
	BUK9615-100E	100	14	15	66	0.82
	BUK9615-100A	100	14.4	15	75	0.65
	BUK9620-100B	100	18.5	20	63	0.75
	BUK7619-100B	100	19		64	
	BUK7620-100A	100	20		63	0.75
	BUK7626-100B	100	26		49	0.95
	BUK9628-100A	100	27	28	49	0.9
	BUK9629-100B	100	27	29	46	0.95
	BUK7628-100A	100	28		47	0.9
	BUK7631-100E	100	31		34	1.56
	BUK7635-100A	100	35		41	1
	BUK9637-100E	100	36	37	31	1.56
	BUK9640-100A	100	39	40	39	0.95
	BUK7640-100A	100	40		37	1.1
	BUK9660-100A	100	58	60	26	1.4
	BUK7660-100A	100	60		26	1.4

For the most current product information go to www.nxp.com/mosfets (updated daily!)

100 V N-channel automotive TrenchMOS – Part 2

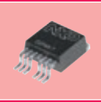
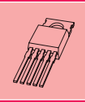
types in **bold** represent new products

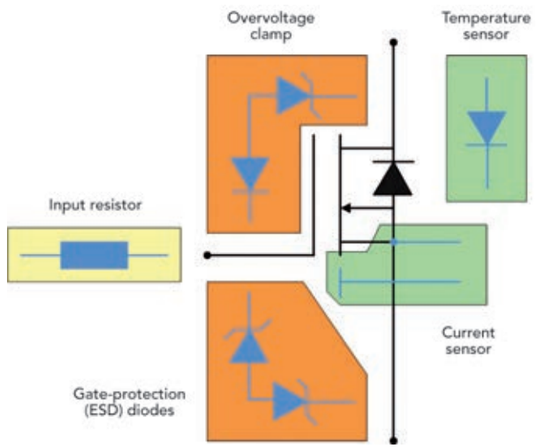
Package name	Type number	V_{DS} [max] [V]	R_{DSon} [max] @ 10 V [mΩ]	R_{DSon} [max] @ 5 V [mΩ]	I_D [max] @ 25 °C [A]	$R_{th(j-mb)}$ [max] [K/W]
D²PAK (SOT404) 	BUK9675-100A	100	72	75	23	1.5
	BUK7675-100A	100	75		23	1.5
	BUK96180-100A	100	173	180	11	2.8
DPAK (SOT428) 	BUK7227-100B	100	27		48	0.95
	BUK9230-100B	100	28	30	47	0.95
	BUK9240-100A	100	38.6	40	33	1.3
	BUK7240-100A	100	40		34	1.3
	BUK9275-100A	100	72	75	21.7	1.7
	BUK7275-100A	100	75		21.7	1.7
TO-220AB (SOT78A) 	BUK755R4-100E	100	5.2		120	0.43
	BUK9510-100B	100	9.7	10	75	0.5
	BUK7510-100B	100	10		75	0.5
	BUK9515-100A	100	14.4	15	75	0.65
	BUK7515-100A	100	15		75	0.5
	BUK9520-100B	100	18.5	20	63	0.75
	BUK9520-100A	100	19	20	63	0.75
	BUK7520-100A	100	20		63	0.75
	BUK7526-100B	100	26		49	0.95
	BUK9529-100B	100	27	29	46	0.95
	BUK7528-100A	100	28		47	0.9
	BUK9535-100A	100	34	35	41	1
	BUK7535-100A	100	35		41	1
	BUK7540-100A	100	40		37	1.1
	BUK9575-100A	100	72	75	23	1.5
	BUK7575-100A	100	75		23	1.5
I²PAK (SOT226) 	BUK7E5R2-100E	100	5.2		120	0.43
SC-73 (SOT223) 	BUK9875-100A	100	72	75	7	
	BUK98180-100A	100	173	180	4.6	

For the most current product information go to www.nxp.com/mosfets (updated daily!)

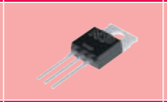
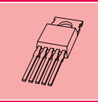
TrenchPLUS MOSFETs

TrenchPLUS is a range of standard MOSFETs with additional protection features, such as current and temperature sensing components, overvoltage clamps, and gate-protection (ESD) diodes. The system microcontroller can use data gathered from these sensors to implement cost-effective protection features, thus eliminating the need to design with protected power devices. All the standard products listed below offer one or more "PLUS" features. Custom versions can be developed for high-volume applications.

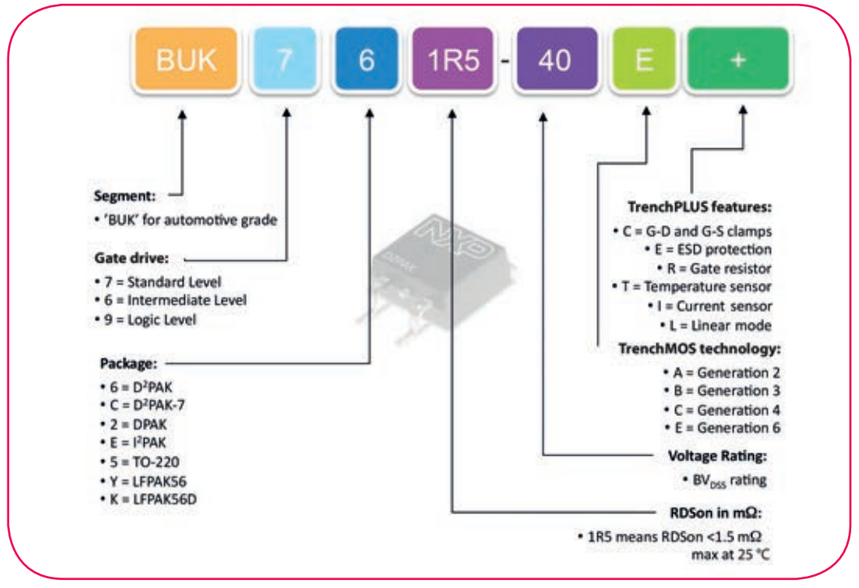
V_{DS} (V)	R_{DSon} (max) @ 10 V (mΩ)	R_{DSon} (max) @ 5 V (mΩ)	I_D (max) @ 25 °C (A)	Temperature sensing	Current sensing	Gate source clamps	Gate drain clamps	Gate resistor	Surface-mount package		Leaded package	
									7-pin D²PAK (SOT427)	5-pin D²PAK (SOT426)	TO220AB (SOT78C)	5-pin TO220 (SOT263B-01)
												
									10.0 x 15 x 4.5	10.0 x 15.0 x 4.5	15.0 x 10.0 x 4.5	10.0 x 19.0 x 4.5
34	6		75			•	•	•			BUK7L06-34ARC	
34	11		75			•	•	•			BUK7L11-34ARC	
40	4.1		75	•						BUK714R1-40BT		BUK794R1-40BT
40	5		75		•	•				BUK7105-40AIE		BUK7905-40AIE
40	5		75	•		•				BUK7105-40ATE		BUK7905-40ATE
40	5		75									BUK7905-40AI
40	6		75	•	•	•			BUK7C06-40AITE			

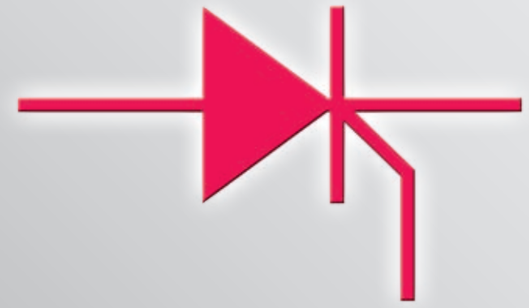


TrenchPLUS MOSFETs

V_{DS} (V)	R_{DSon} (max) @ 10 V (mΩ)	R_{DSon} (max) @ 5 V (mΩ)	I_D (max) @ 25 °C (A)	Temperature sensing	Current sensing	Gate source clamps	Gate drain clamps	Gate resistor	Surface-mount package		Leaded package	
									7-pin D²PAK (SOT427)	5-pin D²PAK (SOT426)	TO220AB (SOT78C)	5-pin TO220 (SOT263B-01)
												
									10.0 x 15 x 4.5	10.0 x 15.0 x 4.5	15.0 x 10.0 x 4.5	10.0 x 19.0 x 4.5
40	6.6	7	75	•		•	•			BUK9107-40ATC		BUK9907-40ATC
40	8		75	•		•	•			BUK7107-40ATC		BUK7907-40ATC
40	8		75		•	•				BUK7108-40AIE		BUK7908-40AIE
55	6,6	7	75	•		•				BUK9107-55ATE		BUK9907-55ATE
55	7		75		•	•				BUK7107-55AIE		BUK7907-55AIE
55	7		75	•		•				BUK7107-55ATE		BUK7907-55ATE
55	8		75	•	•	•			BUK7C08-55AITE			
55	9	10	75	•	•				BUK9C10-55BIT			
75	9		75		•	•				BUK7109-75AIE		BUK7909-75AIE
75	9		75	•		•				BUK7109-75ATE		BUK7909-75ATE
75	10		75	•	•	•			BUK7C10-75AITE			

Automotive TrenchPLUS part numbering





Thyristors

AC Thyristor Triacs

(3Q Hi-Com power switches, overvoltage protection)

types in **bold** represent new products

$I_{T(RMS)}$ (A)	V_{DRM} (V)	I_{GT} (max) (mA)	SOT78 (TO220AB)	SOT186A (isolated TO220AB)	SOT226 (I^2PAK)	SOT404 (D^2PAK)	SOT428 (DPAK)
2	800	E		ACTT2X			ACTT2S
4	800	C/E		ACTT4X			ACTT4S
6	800	E	ACTT6	ACTT6X	ACTT6G	ACTT6B	
8	800	C0/C0T	**ACTT8**	**ACTT8X**		**ACTT8B**	
10	800	C/CT	**ACTT10**	**ACTT10X**			
12	800	C/CT	**ACTT12**	**ACTT12X**		**ACTT12B**	

I_{GT} key: C = 35 mA; C0 = 5 - 30 mA; E = 10 mA

T: High Tjmax 150 °C

In the spotlight

AC Thyristor Triac ACTT10 series, ACTT12 series

- Planar passivated with overvoltage clamping function
- High-energy surge handling
- Very high dV_D/dt for maximum immunity to false triggering
- High Tj(max) to 150 °C

AC Thyristors

(2Q Hi-Com power switches, exclusive negative gate triggering, overvoltage protection; SMD with "Common" mounting base.)

types in **bold** represent new products

$I_{T(RMS)}$ (A)	V_{DRM} (V)	I_{GT} (max) (mA)	SOT54 (TO92)	SOT223	SO8
0.2	600	D			ACT102H
0.8	600	D/E	ACT108	ACT108W	
0.8	800	E	**ACT108**	**ACT108W**	

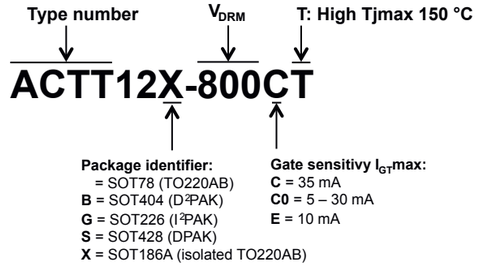
I_{GT} key: D = 5 mA; E = 10 mA

In the spotlight

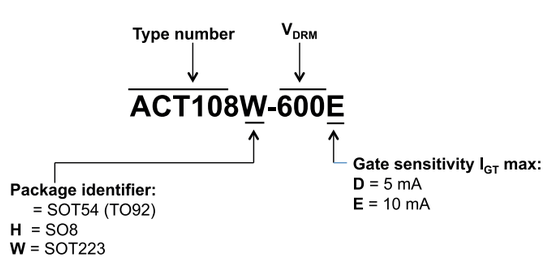
AC Thyristor ACT108W-800E

- Planar passivated with overvoltage clamping function
- Enhanced working voltage with enhanced overvoltage clamping capability
- Very high false-trigger immunity
- Exclusive negative gate triggering
- "Common" terminal on mounting base for multiple ACTs on shared cooling pad

AC Thyristor Triac part numbering



AC Thyristor part numbering



Temperature and Overload Protected Triacs (TOPTriacs)

(2Q Hi-Com power switches, exclusive negative gate triggering, over-temperature protection)

types in ***bold italic underlined*** represent products in development

$I_{T(RMS)}$ (A)	V_{DRM} (V)	I_{GT} (max) (mA)	SOT78 (TO220)
12	800	C0	***TOPT12***
16	800	C0	***TOPT16***

I_{GT} key: C0 = 5 - 35 mA

In the spotlight

TOPTriac TOPT12-800C0

- Planar passivated for voltage ruggedness and reliability
- Over-temperature safety shutdown feature
- Hi-Com technology with min I_{GT} spec for highest noise immunity
- Exclusive negative gate triggering

3-quadrant Hi-Com

types in **bold** represent new products
types in ***bold italic underlined*** represent products in development

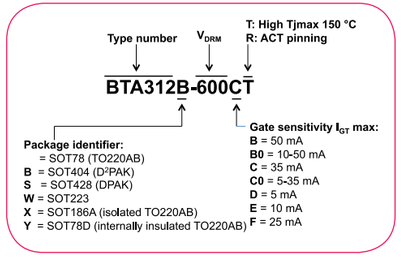
$I_{T(RMS)}$ (A)	V_{DRM} (V)	I_{GT} (max) (mA)	SOT54 (TO92)	SOT78 (TO220AB)	SOT78D (internally insulated TO220AB)	SOT186A (isolated TO220AB)	SOT223	SOT404 (D^2PAK)	SOT428 (DPAK)
0.8	600 / 800	D					**BTA2008W**		
		D/E	BTA2008						
	1000	D	**BTA2008**						
1	600 / 800	B/E/ER	BTA201						
		E					BTA201W		
	600	B/C/D/E/F					BTA204W*		
	800	C/E					BTA204W*		
2	600 / 800	D/E				BTA202X			
4	600	B/C/D/E/F		BTA204		BTA204X			BTA204S
	800	B/C/E		BTA204		BTA204X			BTA204S
	1000	C				BTA204X			BTA204S
6	800	CT/ET		BTA206		BTA206X			
8	600	D		BTA208		BTA208X			BTA208S
	600 / 800	B/E/F		BTA208		BTA208X			BTA208S
	800	B0/C0				**BTA308X**			
	1000	B				BTA208X			
		C				BTA208X		BTA208B	
		C0				**BTA208X**			
10	600 / 800	C/D/E		BTA310		BTA310X			
		BT/CT/ET		BTA410*	BTA410Y*	BTA410X*			
12	600	CT		BTA312				BTA312B	
		D		BTA312		BTA312X		BTA312B	
	600 / 800	B/C/E		BTA312		BTA312X		BTA312B	
		C			BTA312Y				
		B/C			BTA412Y*				
	800	CT		BTA312					
		ET		BTA312				BTA312B	
16	600	BT		BTA316				BTA316B	
		B0		**BTA316**				**BTA316B**	
		D		BTA316					
	600 / 800	B/C/E		BTA316		BTA316X		BTA316B	
		ET		BTA316					
		B/C			BTA416Y*				
	800	B0		**BTA316**		**BTA316X**			
20		BT/CT		**BTA420***	**BTA420Y***	**BTA420X***			
25	600	BT		BTA225					
	600 / 800	B		BTA225				BTA225B	
	800	BT/CT			**BTA425Y***				
		B/BT				**BTA425X***			
30		BT		**BTA330**		**BTA330X**			

* Large chip / high surge I_{TSM}

I_{GT} key: B = 50 mA, B0 = 10 - 50 mA, C = 35 mA, C0 = 5 - 35 mA, D = 5 mA, E = 10 mA, F = 25 mA

T: High Tj(max) 150 °C R: ACT pinning

3-quadrant triac part numbering



In the spotlight

3-quadrant Hi-Com triac BTA316-600B0, BTA316B-600B0

- Planar passivated for voltage ruggedness and reliability
- Minimum I_{GT} spec of 10 mA for high noise immunity guarantee
- High commutation, high dV_D/dt for maximum immunity to false triggering

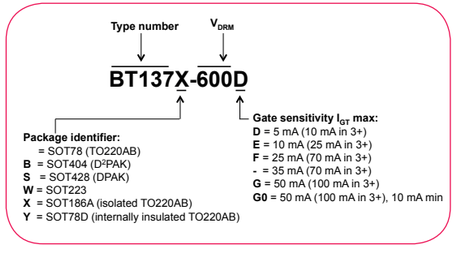
4-quadrant triacs

types in **bold** represent new products

$I_{T(RMS)}$ (A)	V_{DRM} (V)	I_{GT} (max) (mA)	SOT54 (TO92)	SOT78 (TO220AB)	SOT78D (internally insulated TO220AB)	SOT82	SOT186A (isolated TO220AB)	SOT223	SOT404 (D^2PAK)	SOT428 (DPAK)
0.6	400	5/5/5/7	MAC97A6							
	600	5/5/5/7	MAC97A8							
1	600	3/3/3/7						BT131W		
	600 / 800	3/3/3/7	BT131							
		5/5/5/7	BT131-D							
		10/10/10/10	BT131-E							
		3/3/3/5	Z0103MA/NA					Z0103MN/NN		
		5/5/5/7	Z0107MA/NA					Z0107MN/NN		
		10/10/10/10	Z0109MA/NA					Z0109MN/NN		
		3/3/3/5	Z0103MA0/NA0**					Z0103MN0/NN0**		
		5/5/5/7	Z0107MA0/NA0**					Z0107MN0/NN0**		
		10/10/10/10	Z0109MA0/NA0**					Z0109MN0/NN0**		
	600	5/5/5/10	BT132-D*							
		D/E/-						BT134W*		
	800	-						BT134W*		
4	600	D/E/-/G				BT134				
	800	E/-				BT134				
	600 / 800	D/E		BT234*			BT234X*			
	600	D/-		BT136			BT136X			BT136S
		F					BT136X			BT136S
	600 / 800	E		BT136			BT136X		BT136B	BT136S
	800	F								BT136S
		-					BT136X			BT136S
6	600	F/-/G					BT236X			
	800	-/G					BT236X			
8	600	D/-/G		BT137			BT137X			BT137S
		E		BT137			BT137X		BT137B	BT137S
	800	F							BT137B	BT137S
		-		BT137			BT137X		BT137B	
		G							BT137B	BT137S
12	600	D		BT138			BT138X			
		-/G		BT138			BT138X		BT138B	
		F					BT138X		BT138B	
		G0/G0T		**BT138**						
	600 / 800	E		BT138	BT138Y		BT138X		BT138B	
	800	F					BT138X			
	800	-		BT138			BT138X			
	800	G		BT138						
16	600	E/-		BT139			BT139X		BT139B	
		F/G					BT139X		BT139B	
		G0/G0T		**BT139**						
	800	E		BT139					BT139B	
		F							BT139B	
		-		BT139			BT139X		BT139B	
		G		BT139					BT139B	
20	600	50/50/50/75					MAC223A8X			
25	400	50/50/50/75		MAC223A6						
	600	G0/G0T		**BTA140**						
	600 / 800	-		BTA140						

I_{GT} key:
D = 5 mA (10 mA in 3+) E = 10 mA (25 mA in 3+) F = 25 mA (70 mA in 3+) - = 35 mA (70 mA in 3+) G = 50 mA (100 mA in 3+) G0 = 50 mA (100 mA in 3+), 10 mA min
T: High $T_j$max 150°C * Large chip / high I_{TSM} ** Enhanced immunity to false triggering

4Q triac part numbering



In the spotlight

4-quadrant triac BT137-G0(T) series

- Planar passivated for voltage ruggedness and reliability
- Optimized I_{GT} with min spec for highest noise immunity
- Highest false-trigger immunity for a 4Q triac
- The first 4Q triac to offer high T_j(max) capability

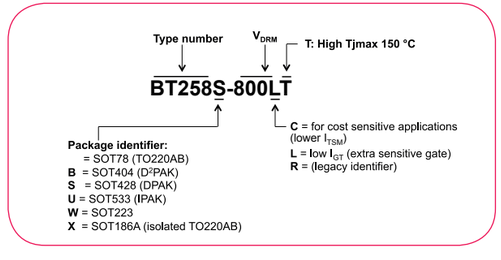
Silicon Controlled rectifiers

types in **bold** represent new products
types in ***bold italic underlined*** represent products in development

$I_{T(RMS)}$ (A)	V_{DRM} & V_{RRM} (V)	I_{GT} (max) (mA)	SOT23	SOT54 (TO92)	SOT78 (TO220AB)	SOT82	SOT186A (isolated TO220AB)	SOT223	SOT404 (D^2PAK)	SOT428 (DPAK)	SOT533 (IPAK)
0.8	200	0.2						MCR08BT1			
	400	0.012		EC103D1				**EC103D1W**			
	600	0.5µA min - 7µA max		N0118GA							
	200 / 400 / 600	0.2		BT149B/D/G							
		0.2		BT169B/D/G							
	400	0.015 min - 0.05 max		BT169D-L							
	500 / 600	0.02 min - 0.2 max		BT168E/G							
	600	0.015 min - 0.05 max	***NCR100-8L***	BT169G-L							
		0.1	***NCR100-8M***								
	800	0.1		BT169H							
		0.015 min - 0.05 max		**BT169H-L**							
	850	0.015 min - 0.05 max						**NCR100W-10L**			
		0.1						**NCR100W-10M**			
	1000	0.015 min - 0.05 max						***NCR100W-12L***			
		0.1						***NCR100W-12M***			
1	600	0.02 min - 0.2 max						BT168GW			
		0.07 min - 0.45 max						**BT168GWF****			
		0.2						BT148W-R*			
4	400 / 500 / 600	0.2				BT148-R					
	500	0.2			BT150-R						
	600	0.2								BT150S-R	
8	500 / 600 / 800	0.2			BT258-R		BT258X-R				BT258U-R
	600	0.2									
		5								BT300S-R	
	800	0.05								BT258S-LT	
		0.2								BT258S-R	
12	650	0.2								**BT151S-S**	
	500 / 650	5			BT151-L*					BT151S-L*	
	650	15								BTH151S-R*	
	500 / 650 / 800	15			BT151-C		BT151X-C				BT151U-C
		15			BT151-R*		BT151X-R*			BT151S-R*	
	500 / 1000	15			BT151-RT*						
16	600	15			**TYN16-CT**		**TYN16X-CT**				
	600 / 800	25			**TYN16-RT***		**TYN16X-RT***				
20	400 / 600 / 800	32			BT152-R		BT152X-R		BT152B-R		
	500	32			BT152-RT						
	600	32							**TYN20B-T**		
	800	32			**TYN20-T**		**TYN20X-T**		**TYN20B-T**		
25	600	35			BT145-R						

* Large chip / high I_{TSM} ** Hi-Com / fast turn-off T: high $T_{j(max)}$ 150 °C

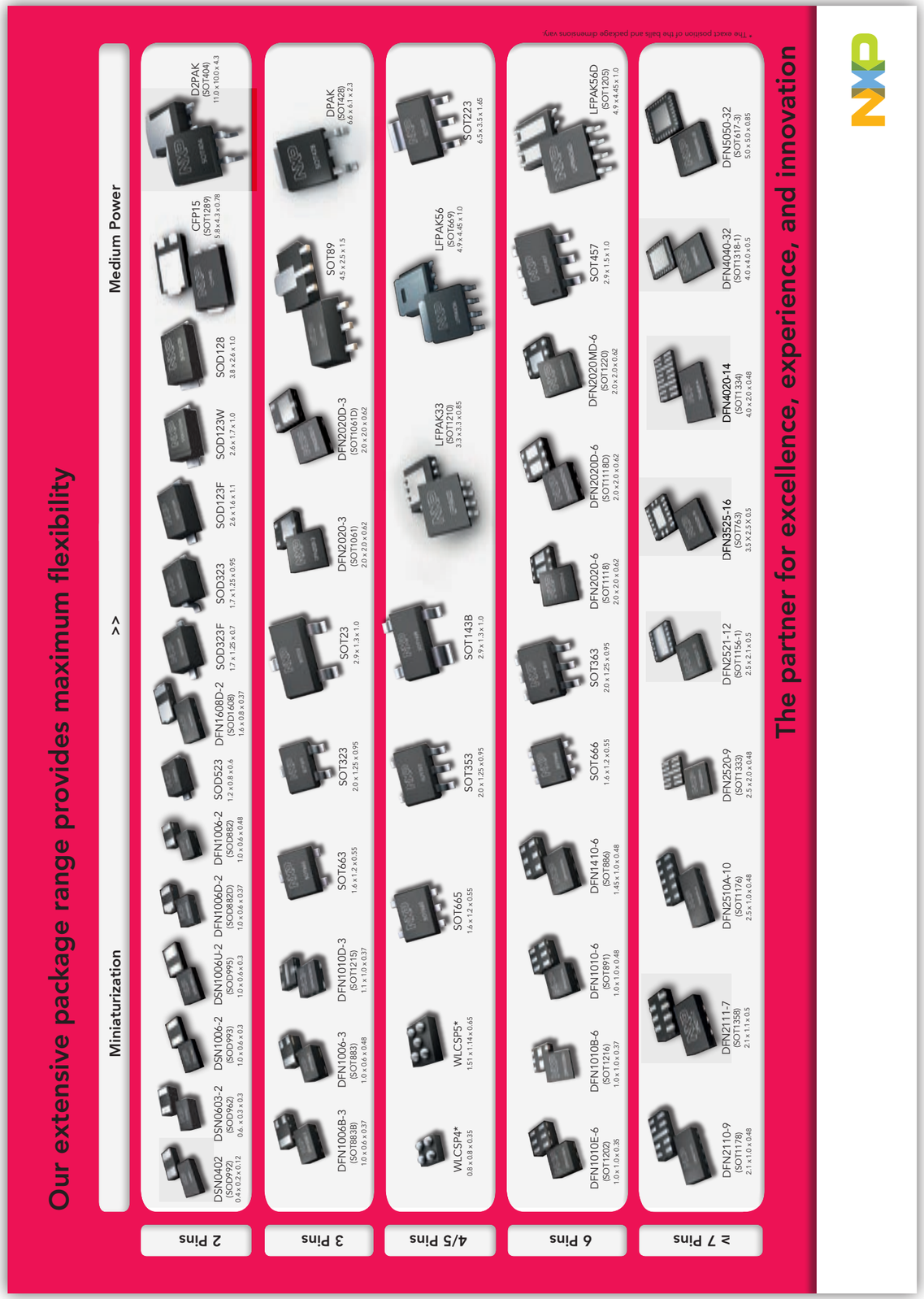
Silicon Controlled Rectifiers part numbering

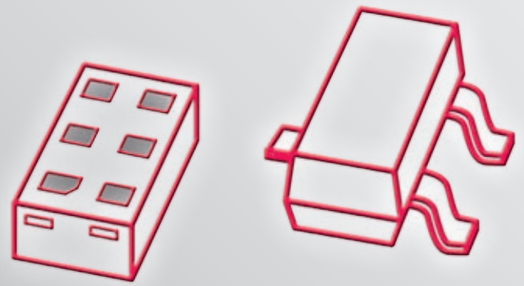


In the spotlight

Silicon Controlled Rectifiers TYN16 series, TYN20 series

- Planar passivated for voltage ruggedness and reliability
- High Tj(max) of 150 °C
- High thermal cycling capability





Packages

Package details and packing methods SMD – Part 1

Package details							Packing methods														
							Packing quantity and ordering code (12NC ending)														
Pins	Package	Package size (l x w x h) (mm)	Lead pitch (mm)	Package	Packing method and tape dimension	Reel dimension (d x w) (mm)	500	800	1000	1400	1500	2000	2500	3000	4000	4500	5000	6000	8000	9000	10000
2	DSN0402-2 (SOD992)	0.4 x 0.2 x 0.12	0.25		2 mm pitch, 8 mm tape and reel	180 x 8															-315
	DSN1006-2 (SOD993)	1.0 x 0.6 x 0.3	0.65		2 mm pitch, 8 mm tape and reel	180 x 8															-315
	DSN1006U-2 (SOD995)	1.0 x 0.6 x 0.3	0.55		2 mm pitch, 8 mm tape and reel	180 x 8															-315
	DFN1006-2 (SOD882)	1.0 x 0.6 x 0.48	0.65		2 mm pitch. 8 mm tape and reel	180 x 8															-315
	DFN1006D-2 (SOD882D)	1.0 x 0.6 x 0.37	0.65		2 mm pitch. 8 mm tape and reel	180 x 8															-315
	DFN1608D-2 (SOD 1608)	1.6 x 0.8 x 0.37	0.94		2 mm pitch. 8 mm tape and reel	180 x 8													-315		
	DSN0603-2 (SOD962)	0.6 x 0.3 x 0.3	0.4		2 mm pitch. 8 mm tape and reel	180 x 8														-315	
	SOD80C (MiniMelf)	3.5 x 1.5 x 1.5			4 mm pitch. 8 mm tape and reel	180 x 8							-115								
					4 mm pitch. 8 mm tape and reel	330 x 8															-135
	SOD123F	2.6 x 1.6 x 1.1			4 mm pitch. 8 mm tape and reel	180 x 8								-115							
	SOD123W	2.6 x 1.7 x 1.0			4 mm pitch. 8 mm tape and reel	180 x 8								-115							
	SOD128	3.8 x 2.5 x 1.0			4 mm pitch. 12 mm tape and reel	180 x 12								-115							
	SOD323 (SC-76)	1.7 x 1.25 x 0.95			4 mm pitch. 8 mm tape and reel	180 x 8								-115							
					4 mm pitch. 8 mm tape and reel	286 x 8															-135
					10 reels in one box	286 x 8															-135
	SOD323F (SC-90)	1.7 x 1.25 x 0.7			4 mm pitch. 8 mm tape and reel	180 x 8								-115							
						286 x 8															-135
	SOD523 (SC-79)	1.2 x 0.8 x 0.6			2 mm pitch. 8 mm tape and reel	180 x 8													-315		
					4 mm pitch. 8 mm tape and reel	180 x 8								-115							
					4 mm pitch. 8 mm tape and reel	286 x 8															-135
3	CFP15 (SOT1289)	5.8 x 4.3 x 0.78	2.13		8 mm pitch. 12 mm tape and reel	330 x 12					-146						-139				
	DFN1006-3 (SOT883)	1.0 x 0.6 x 0.48	0.65		2 mm pitch. 8 mm tape and reel	180 x 8															-315
	DFN1006B-3 (SOT883B)	1.0 x 0.6 x 0.37	0.65		2 mm pitch. 8 mm tape and reel	180 x 8															-315
	DFN1010D-3 (SOT1215)	1.1 x 1.0 x 0.37	0.75		4 mm pitch. 8 mm tape and reel	180 x 8											-115				
	DFN2020-3 (SOT1061)	2.0 x 2.0 x 0.62	1.3		4 mm pitch. 8 mm tape and reel	180 x 8								-115							
	DFN2020D-3 (SOT1061D)	2.0 x 2.0 x 0.62	1.3		4 mm pitch, 8 mm tape and reel	180 x 8								-115							
	DPAK (SOT428)	6.6 x 6.1 x 2.3	4.57		8 mm pitch. 16 mm tape and reel	330 x 16							-118								
	D2PAK (SOT404)	10 x 9.6 x 4.3	5.08		16 mm pitch. 24 mm tape and reel	330 x 24		118													
	SOT23	2.9 x 1.3 x 1.0	0.95		4 mm pitch. 8 mm tape and reel	180 x 8								-215							
						286 x 8															-235
					10 reels in one box	180 x 8								-185							
	SOT89 (SC-62)	4.5 x 2.5 x 1.5	1.5		8 mm pitch. 12 mm tape and reel	180 x 12			-115												
					8 mm pitch. 12 mm tape and reel	330 x 12									-135						
					8 mm pitch. 12 mm tape and reel	180 x 12			-146												
					8 mm pitch. 12 mm tape and reel	180 x 12			-147												
	SOT323 (SC-70)	2.0 x 1.25 x 0.95	0.65		4 mm pitch. 8 mm tape and reel	180 x 8								-115							
					4 mm pitch. 8 mm tape and reel	286 x 8															-135
	SOT663	1.2 x 1.6 x 0.55	0.5		4 mm pitch. 8 mm tape and reel	180 x 8									-115						

Package details and packing methods SMD – Part 2

Package details							Packing methods														
							Packing quantity and ordering code (12NC ending)														
Pins	Package	Package size (l x w x h) (mm)	Lead pitch (mm)	Package	Packing method and tape dimension	Reel dimension (d x w) (mm)	500	800	1000	1400	1500	2000	2500	3000	4000	4500	5000	6000	8000	9000	10000
4	LFPAK33 (SOT1210)	3.3 x 3.3 x 0.85	-		8 mm pitch, 12 mm tape and reel	180 x 12					x										
	LFPAK56 (SOT669)	4.9 x 4.45 x 1.0	1.27		8 mm pitch. 12 mm tape and reel	180 x 12					-115										
	SOT143B	2.9 x 1.3 x 1.0	1.9		4 mm pitch. 8 mm tape and reel	180 x 8								-215							
					4 mm pitch. 8 mm tape and reel	286 x 8															-235
	SOT223 (SC-73)	6.5 x 3.5 x 1.65	2.3		8 mm pitch. 12 mm tape and reel	180 x 12			-115												
					8 mm pitch. 12 mm tape and reel	330 x 12									-135						
5	SOT353 (SC-88 A)	2.0 x 1.25 x 0.95	0.65		4 mm pitch. 8 mm tape and reel	180 x 8								-115							
					4 mm pitch. 8 mm tape and reel	286 x 8															-135
					4 mm pitch. 8 mm tape and reel	180 x 8								-125							
					4 mm pitch. 8 mm tape and reel	286 x 8															-165
	SOT665	1.6 x 1.2 x 0.55	0.5		2 mm pitch. 8 mm tape and reel	180 x 8														-315	
					4 mm pitch. 8 mm tape and reel	180 x 8								-115							
6	DFN1010-6 (SOT891)	1.0 x 1.0 x 0.48	0.35		4 mm pitch. 8 mm tape and reel	180 x 8											-132				
	DFN1010B-6 (SOT1202)	1.0 x 1.0 x 0.33	0.35		4 mm pitch. 8 mm tape and reel	180 x 8											-132				
	DFN1010E-6 (SOT1202)	1.0 x 1.0 x 0.33	0.35		5 mm pitch. 8 mm tape and reel	181 x 8											-132				
	DFN1410-6 (SOT886)	1.45 x 1.0 x 0.48	0.5		4 mm pitch. 8 mm tape and reel	180 x 8											-115				
					4 mm pitch. 8 mm tape and reel	180 x 8											-132				
	DFN1616-6 (SOT 1189)	1.6 x 1.6 x 0.48	0.5		4 mm pitch. 8 mm tape and reel	180 x 8									-115						
	DFN2020-6 (SOT 1118)	2.0 x 2.0 x 0.62	0.65		4 mm pitch. 8 mm tape and reel	180 x 8								-115							
														-184							
	DFN2020D-6 (SOT1118D)	2.0 x 2.0 x 0.62	0.65		4 mm pitch, 8 mm tape and reel	180 x 8								-115							
	DFN2020MD-6 (SOT1220)	2.0 x 2.0 x 0.62	0.65		4 mm pitch. 8 mm tape and reel	180 x 8								-115							
														-125							
	LFPAK56D (SOT1205)	4.9 x 4.45 x 1.0	1.27		8 mm pitch. 12 mm tape and reel	180 x 12					-115										
	SOT363 (SC-88)	2.0 x 1.25 x 0.95	0.65		4 mm pitch. 8 mm tape and reel	180 x 8								-115							
					4 mm pitch. 8 mm tape and reel	286 x 8															-135
					4 mm pitch. 8 mm tape and reel	180 x 8								-125							
					4 mm pitch. 8 mm tape and reel	286 x 8															-165
	SOT457 (SC-74)	2.9 x 1.5 x 1.0	0.95		4 mm pitch. 8 mm tape and reel	180 x 8								-115							
					4 mm pitch. 8 mm tape and reel	286 x 8															-135
					4 mm pitch. 8 mm tape and reel	180 x 8								-125							
					4 mm pitch. 8 mm tape and reel	286 x 8															-165
	SOT666	1.6 x 1.2 x 0.55	0.5		2 mm pitch. 8 mm tape and reel	180 x 8														-315	
					4 mm pitch. 8 mm tape and reel	180 x 8									-115							
7	DFN2111-7 (SOT1358)	2.1 x 1.1 x 0.5	1.3		4 mm pitch, 8 mm tape and reel	180 x 9								-115							
	D2PAK-7 (SOT428)	10 x 15.3 x 4.3	-		16 mm pitch, 24 mm tape and reel	330 x 24		x													

Package details and packing methods SMD – Part 3

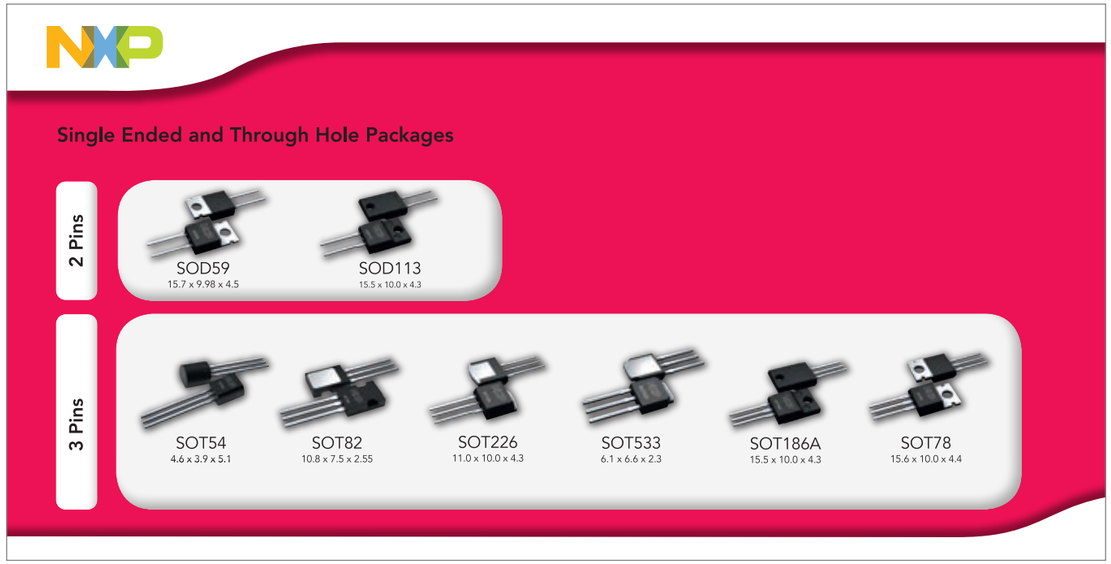
Package details					Packing methods																
							Packing quantity and ordering code (12NC ending)														
Pins	Package	Package size (l x w x h) (mm)	Lead pitch (mm)	Package	Packing method and tape dimension	Reel dimension (d x w) (mm)	500	800	1000	1400	1500	2000	2500	3000	4000	4500	5000	6000	8000	9000	10000
8	DFN1712-8 (SOT1157)	1.7 x 1.2 x 0.48	0.4		4 mm pitch. 8 mm tape and reel	180 x 8									-132						
	DFN1714-8 (SOT1166)	1.7 x 1.35 x 0.52	0.4		4 mm pitch. 8 mm tape and reel	180 x 8									-115						
					4 mm pitch. 8 mm tape and reel	180 x 8									-132						
	DFN1714U-8 (SOT983)	1.7 x 1.35 x 0.48	0.4		4 mm pitch. 8 mm tape and reel	180 x 8									-118						
	DFN3333-8 (SOT873-1)	3.3 x 3.3 x 1.0	0.65		8 mm pitch. 12 mm tape and reel	180 x 12				-118											
	SOT96 (S08)	4.9 x 3.9 x 1.75	1.27		8 mm pitch. 12 mm tape and reel	180 x 12			-115												
					8 mm pitch. 12 mm tape and reel	330 x 12							-518								
					8 mm pitch. 12 mm tape and reel	331 x 12							-118								
	SOT505 (TSSOP8)	3.0 x 3.0 x 1.1	0.65		8 mm pitch. 12 mm tape and reel	330 x 12							-118								
9	DFN2110-9 (SOT1178)	2.1 x 1.0 x 0.48	0.4		4 mm pitch. 8 mm tape and reel	180 x 8									-115						
	DFN2520-9 (SOT1333)	2.5 x 2.0 x 0.48	0.5			-									-132						
10	DFN2510-10 (SOT1165)	2.5 x 1.0 x 0.48	0.5		4 mm pitch. 8 mm tape and reel	180 x 8											-115				
	DFN2510A-10 (SOT1176)	2.5 x 1.0 x 0.48	0.5		4 mm pitch. 8 mm tape and reel	180 x 8											-115				
	DFN2626-10 (SOT1197)	2.6 x 2.6 x 0.48	0.5		4 mm pitch. 8 mm tape and reel	180 x 8									-115						
	SOT552 (TSSOP10)	3.0 x 3.0 x 1.1	0.5		8 mm pitch. 12 mm tape and reel	330 x 12							-118								
12	DFN2512-12 (SOT1158)	2.5 x 1.2 x 0.48	0.4		4 mm pitch. 8 mm tape and reel	180 x 8									-132						
	DFN2514-12 (SOT1167)	2.5 x 1.35 x 0.53	0.4		4 mm pitch. 8 mm tape and reel	180 x 8									-132						
	DFN2514U-12 (SOT984)	2.5 x 1.35 x 0.48	0.4		4 mm pitch. 8 mm tape and reel	180 x 8									-118						
	DFN2521-12 (SOT 1156)	2.5 x 2.1 x 0.48	0.4		4 mm pitch. 8 mm tape and reel	180 x 8									-132						
14	DFN4020-14 (SOT1334)	4.0 x 2.0 x 0.48	0.5		4 mm pitch, 12 mm tape and reel	180 x 12									-115						
	SOT108 (S014)	8.65 x 3.9 x 1.75	1.27		8 mm pitch. 16 mm tape and reel	330 x 16							-118								
	SOT337 (SSOP14)	6.2 x 5.3 x 2	0.65		12 mm pitch. 16 mm tape and reel	330 x 16						-118									
	SOT402 (TSSOP14)	5.0 x 4.4 x 1.1	0.65		8 mm pitch. 12 mm tape and reel	330 x 12							-118								
	DFN3312-16 (SOT 1159)	3.3 x 1.2 x 0.48	0.4		4 mm pitch. 12 mm tape and reel	180 x 12									-132						
	DFN3314-16 (SOT1168)	3.3 x 1.35 x 0.53	0.4		4 mm pitch. 8 mm tape and reel	180 x 8									-132						
	DFN3314U-16 (SOT985)	3.3 x 1.35 x 0.48	0.4		4 mm pitch. 12 mm tape and reel	180 x 12									-118						
	SOT519 (SSOP16)	4.9 x 3.9 x 1.73	0.635		8 mm pitch. 12 mm tape and reel	330 x 12							-118								
20	SOT163 (SO20)	12.8 x 7.5 x 2.65	1.27		12 mm pitch. 24 mm tape and reel	180 x 24						-518									
					12 mm pitch. 24 mm tape and reel	330 x 24						-118									
	SOT360 (TSSOP20)	6.5 x 4.4 x 1.1	0.65		12 mm pitch. 16 mm tape and reel	330 x 16							-118								
32	DFN5050-32 (SOT617)	5.0 x 5.0 x 1.0	0.5		8 mm pitch. 12 mm tape and reel	330 x 12												-118			
					8 mm pitch. 12 mm tape and reel	330 x 12												-128			
36	SOT357	10.0 x 10.0 x 1.2	0.5		16 mm pitch. 24 mm tape and reel	330 x 24					-118										
38	SOT510 (TSSOP38)	9.7 x 4.4 x 1.1	0.5		8 mm pitch. 16 mm tape and reel	330 x 16							-118								

Package details and packing methods WLCSP – Part 1

Basic Type	Length x width x height	# of balls	Pitch	Package	Package name
IP3088CX10	3.96 x 1.28 x 0.65	10	0.5		WLCSP10
IP3088CX20	3.96 x 1.28 x 0.65	20	0.5		WLCSP20
IP3319CX6	1.34 x 0.95 x 0.57	6	0.4		WLCSP6
IP3337CX18	2.06 x 1.66 x 0.61	18	0.4		WLCSP18
IP3338CX24	2.11 x 2.11 x 0.61	24	0.4		WLCSP24
IP4027CX20	2.43 x 1.92 x 0.65	20	0.5		WLCSP20
IP4035CX24	2.45 x 2.41 x 0.65	24	0.5		WLCSP24
IP4041CX25	2.41 x 2.41 x 0.65	25	0.5		WLCSP25
IP4042CX5	1.34 x 0.94 x 0.65	5	0.5		WLCSP5
IP4043CX5	1.12 x 1.12 x 0.41	5	0.5		WLCSP5
IP4047CX6	1.56 x 1.01 x 0.65	6	0.5		WLCSP6
IP4048CX5	1.28 x 0.91 x 0.65	5	0.5		WLCSP5
IP4049CX5	1.28 x 0.91 x 0.65	5	0.5		WLCSP5
IP4053CX15	2.96 x 1.32 x 0.65	15	0.5		WLCSP15
IP4054CX15	2.96 x 1.32 x 0.65	15	0.5		WLCSP15
IP4060CX16	1.96 x 1.97 x 0.7	16	0.5		WLCSP16
IP4064CX8	1.41 x 1.41 x 0.65	8	0.5		WLCSP8
IP4065CX11	1.97 x 1.47 x 0.65	11	0.5		WLCSP11
IP4085CX4	0.91 x 0.91 x 0.65	4	0.5		WLCSP4
IP4302CX2	0.7 x 0.52 x 0.38	2	0.4		WLCSP2
IP4303CX4	0.76 x 0.76 x 0.61	4	0.4		WLCSP4
IP4306CX2	0.67 x 0.49 x 0.38	2	0.4		WLCSP2
IP4310CX8	1.16 x 1.16 x 0.61	8	0.4		WLCSP8
IP4320CX9	1.16 x 1.16 x 0.61	9	0.4		WLCSP9
IP4327CX15	2.36 x 1.05 x 0.61	15	0.4		WLCSP15
IP4337CX18	1.96 x 1.61 x 0.61	18	0.4		WLCSP18
IP4338CX24	2.01 x 1.96 x 0.61	24	0.4		WLCSP24

Package details and packing methods WLCSP – Part 2

Basic Type	Length x width x height	# of balls	Pitch	Package	Package name
IP4340CX15	1.56 x 1.56 x 0.47	15	0.4		WLCSP15
IP4342CX5	1.06 x 0.76 x 0.20	5	0.4		WLCSP5
IP4343CX5	0.93 x 0.93 x 0.61	5	0.4		WLCSP5
IP4352CX24	2.02 x 2.01 x 0.61	24	0.4		WLCSP24
IP4353CX15	2.36 x 1.06 x 0.61	15	0.4		WLCSP15
IP4355CX6	1.16 x 0.76 x 0.61	6	0.4		WLCSP6
IP4357CX17	2.4 x 1.1 x 0.61	17	0.4		WLCSP17
IP4359CX4	0.76 x 0.76 x 0.61	4	0.4		WLCSP4
IP4364CX8	1.41 x 1.41 x 0.65	8	0.4		WLCSP8
IP4365CX11	1.56 x 1.16 x 0.61	11	0.4		WLCSP11
IP4366CX8	1.41 x 1.41 x 0.65	8	0.4		WLCSP8
IP4369CX4	0.76 x 0.76 x 0.5	4	0.4		WLCSP4
IP4386CX4	0.91 x 0.91 x 0.65	4	0.4		WLCSP4
IP4387CX4	0.91 x 0.91 x 0.65	4	0.4		WLCSP4
PEMI4CSP-RT	1.56 x 1.05 x 0.61	10	0.4		WLCSP10
PEMI4CSP-RW	1.56 x 1.05 x 0.61	10	0.4		WLCSP10
PEMI6CSP-RT	2.36 x 1.05 x 0.61	15	0.4		WLCSP15
PEMI6CSP-RW	2.36 x 1.05 x 0.61	15	0.4		WLCSP15
PEMI8CSP-RT-P	3.16 x 1.05 x 0.61	20	0.4		WLCSP20
PEMI8CSP-RW-P	3.16 x 1.05 x 0.61	20	0.4		WLCSP20
PMCM440VNE	0.78 x 0.78 x 0.35	4	0.4		WLCSP4
PMCM4401VNE	0.78 x 0.78 x 0.35	4	0.4		WLCSP4
PMCM650VNE	1.48 x 0.98 x 0.35	6	0.5		WLCSP6
PMCM440VPE	0.78 x 0.78 x 0.35	4	0.4		WLCSP4
PMCM4401VPE	0.78 x 0.78 x 0.35	4	0.4		WLCSP4
PMCM650VPE	1.48 x 0.98 x 0.35	6	0.5		WLCSP6



Packing details glass diodes, single ended and through hole packages

Pins / leads	Package	Packing method and tape/reel/tube dimensions	Package	Ordering code (12 NC ending)	Packing quantity
2	SOD27	26 mm tape ammo pack, axial		-143	5000 pcs
		52 mm tape ammo pack, axial		-133	10000 pcs
		52 mm reel pack, axial		-113	10000 pcs
	SOD59	Rail packing, 50 pcs/tube, tube length = 520 mm		-127	20 tubes x 50 pcs
	SOD66	52 mm tape ammo pack, axial		-133	10000 pcs
		52 mm reel pack, axial		-113	10000 pcs
	SOD68	26 mm tape ammo pack, axial		-143	5000 pcs
		52 mm reel pack, axial		-113	10000 pcs
		52 mm tape ammo pack, axial		-133	10000 pcs
	SOD113	Rail packing, 50 pcs/tube, tube length = 520 mm		-127	20 tubes x 50 pcs
	SOD141	52 mm tape ammo pack, axial		-133	12000 pcs
		Bulk pack, 500 pcs. per carrier		-112	20 carriers x 500 pcs
3	SOT54	Bulk pack, 1000 pcs/carrier		-112	5 carriers x 1000 pcs
		55 mm reel packing, 2000 pcs/reel, reel dimensions = 380 x 55 mm		-116	5 reels x 2000 pcs
		Ammo packing, 18 mm tape, 2000 pcs/carrier, reel dimensions = 350 x 55 mm		-126	5 carriers x 2000 pcs
		Bulk pack, 1000 pcs/carrier		-412	5 carriers x 1000 pcs
	SOT78 (TO-220)	Rail packing, 50 pcs/tube, tube length = 520 mm		-127	20 tubes x 50 pcs
	SOT78D	Rail packing, 50 pcs/tube, tube length = 520 mm		-127	20 tubes x 50 pcs
	SOT82	Rail packing, 50 pcs/tube, tube length = 390 mm		-127	20 tubes x 50 pcs
	SOT186A (TO-220F)	Rail packing, 50 pcs/tube, tube length = 520 mm		-127	20 tubes x 50 pcs
	I2PAK (SOT226)	Rail packing, 50 pcs/tube, tube length = 520 mm		-127	20 tubes x 50 pcs
	SOT533	Rail packing		-127	75 tubes x 50 pcs
5	SOT263B-1	Rail packing		-127	20 tubes x 50 pcs

Package cross reference list – Part 1

Type	Competitor	NXP	Pins / Leads
µQFN-10L	ST	DFN2510A-10 (SOT1176)	10
µQFN-10L	ST	DFN2520-9 (SOT1333)	9
µQFN-2L	ST	DFN1006-2 (SOD882)	2
6 Lead DFN	ON Semi	DFN2020-6 (SOT1118)	6
CLP0603	Vishay	DSN0603-2 (SOD962)	2
CMAK/ CMPAK	Renesas	SOT323	3
CMPAK/ CMAK	Renesas	SOT323	3
CMPAK-5(T)	Renesas	SOT353	5
CMPAK-6	Renesas	SOT363	6
CP4	Toshiba	SOT143B	4
CS6	Toshiba	DFN1010-6 (SOT891)	6
CST3	Toshiba	DFN1006-3 (SOT883)	3
CST3	Toshiba	DFN1006B-3 (SOT883B)	3
CTS2 (fSC)	Toshiba	DFN1006-2 (SOD882)	2
CTS2 (fSC)	Toshiba	DFN1006D-2 (SOD882D)	2
D²PAK	ON Semi	D²PAK (SOT404)	3
D²PAK	Vishay	D²PAK (SOT404)	3
D²PAK 3	ON Semi	D²PAK (SOT404)	3
D²PAK*	Diodes Inc.	D²PAK (SOT404)	3
DFN1006-3	Diodes Inc.	DFN1006-3 (SOT883)	3
DFN1006H4-3	Diodes Inc.	DFN1006-3 (SOT883)	3
DFN1411*	Diodes Inc.	DFN1010D-3 (SOT1215)	3
DFN2	ST	DSN0603-2 (SOD962)	2
DPAK	ON Semi	DPAK (SOT428)	3
DS014	Infineon	SOT108	14
DSN2	ON Semi	DSN0603-2 (SOD962)	2
DSN2, 1.0 x 0.6	ON Semi	DFN1006D-2 (SOD882D)	2
DSN2, 1.6 x 0.8	ON Semi	DFN1608D-2 (SOD1608)	2
EMD2	Rohm	SOD523	2
EMD3/EMT3	Rohm	DFN1006-3 (SOT883)	3
EMD5/EMT5	Rohm	SOT665	5
EMD6/EMT6/WEMT6	Rohm	SOT666	6
EMT3	Rohm	DFN1006-3 (SOT883)	3
EMT3/EMD3	Rohm	DFN1006-3 (SOT883)	3
EMT3F*	Rohm	DFN1006-3 (SOT883)	3
EMT5*	Rohm	SOT666	6
EMT5/EMD5	Rohm	SOT665	5
EMT6	Rohm	SOT666	6
EMT6/EMD6/WEMT6	Rohm	SOT666	6
ES6	Toshiba	SOT666	6
ES6 ESV	Toshiba	SOT666	6
ESC/TESC	Toshiba	SOD523	2
ESM	Toshiba	DFN1006-3 (SOT883)	3
ESV	Toshiba	SOT665	5
ESV	Toshiba	SOT666	6
FM8	Toshiba	SOT96	8
FS6*	Toshiba	DFN1010B-6 (SOT1216)	6
GMD2	Rohm	DSN0603-2 (SOD962)	2
HUML2020L8 (Dual)	Rohm	DFN2020-6 (SOT1118)	6
HUML2020L8 (Single)	Rohm	DFN2020MD-6 (SOT1220)	6
KMD2	Rohm	DFN1608D-2 (SOD1608)	2
LDPAK(S)-(1)	Renesas	D²PAK (SOT404)	3
LFPAK	Renesas	LFPAK (SOT669)	5
LG A 1.0 x 0.6mm	Texas Instruments	DFN1006B-3 (SOT883B)	3
LLD	Renesas	SOD80C	2
LLDS	Rohm	SOD80C	2
LLP1006-2L	Vishay	DFN1006-2 (SOD882)	2
LLP1006-2L	Vishay	DFN1006D-2 (SOD882D)	2
LLP1006-2M	Vishay	DFN1006-2 (SOD882)	2
LLP1006-2M	Vishay	DFN1006D-2 (SOD882D)	2
LLP75-7L	Vishay	DFN1616-6 (SOT1189)	6
LPDS/LPTS	Rohm	D²PAK (SOT404)	3
LPTS/LPDS	Rohm	D²PAK (SOT404)	3
M-Flat	Toshiba	SOD128	2
Micro 10	ON Semi	SOT552	10

Type	Competitor	NXP	Pins / Leads
Micro 3	Int. Rectifier	SOT23	3
Micro 6	Int. Rectifier	SOT457	6
MiCRO FOOT 0.8 x 0.8*	Vishay	DFN1010D-3 (SOT1215)	3
MiCRO FOOT 1 x 1.2*	Vishay	DFN1010D-3 (SOT1215)	3
MICRO FOOT 1 x 1.5*	Vishay	DFN1010D-3 (SOT1215)	3
MiCRO FOOT 1.6 x 1.6*	Vishay	DFN2020MD-6 (SOT1220)	6
MiCRO FOOT 1 x 1*	Vishay	DFN1010D-3 (SOT1215)	3
MICRO FOOT*	Vishay	DFN2020MD-6 (SOT1220)	6
MicroFET	Fairchild	DFN2020MD-6 (SOT1220)	6
MicroFET 1.6 x 1.6*	Fairchild	DFN2020MD-6 (SOT1220)	6
MiniMelf	Diodes Inc.	SOD80C	2
MiniMelf	ST	SOD80C	2
MiniMelf	Vishay	SOD80C	2
MP6	Renesas	DSN0603-2 (SOD962)	2
MPAK	Renesas	SOT23	3
MPAK	Renesas	SOT23	3
MPAK-4R	Renesas	SOT143B	4
MPT3	Rohm	SOT89	3
MSOP-10L	Semtech	SOT552	10
PG-TD SON-8	Infineon	LFPAK (SOT669)	5
PMDT	Rohm	SOD128	2
PMDU	Rohm	SOD123W	2
PowerDI123	Diodes Inc.	SOD123F	2
PowerDI123	Diodes Inc.	SOD123W	2
PowerDI323	Diodes Inc.	SOD323F	2
PowerDi5	Diodes Inc.	CFP15 (SOT1289)	3
PowerFLAT (6 x 5)	ST	LFPAK (SOT669)	5
PowerFLAT (6 x 5)	ST	LFPAK56D (SOT1205)	6
PowerPAK SC-70	Vishay	DFN2020-6 (SOT1118)	6
PowerPAK SC-70	Vishay	DFN2020MD-6 (SOT1220)	6
PowerPAK SC706L	Vishay	DFN2020-3 (SOT1061)	3
PowerPak SC-70-6L	Vishay	DFN2020-6 (SOT1118)	6
PowerPAK SC-75*	Vishay	DFN2020MD-6 (SOT1220)	6
PowerPak SC-75-6L*	Vishay	DFN2020MD-6 (SOT1220)	6
PowerPAK SO-8	Vishay	LFPAK (SOT669)	5
PW-Mini	Toshiba	SOT89	3
S08	Vishay	SOT96	8
SC2	Toshiba	DSN0603-2 (SOD962)	2
SC59	Diodes Inc.	SOT23	3
SC70	ON Semi	SOT323	3
SC-70	ON Semi	SOT323	3
SC-70, 3 leads	Vishay	SOT323	3
SC70-3	Vishay	SOT323	3
SC70-3	AOS	SOT323	3
SC70-5L	Semtech	SOT353	5
SC70-6	Vishay	SOT363	6
SC70-6	AOS	SOT363	6
SC70-6	Fairchild	SOT363	6
SC70-6L	Semtech	SOT363	6
SC74 TSOP6	Infineon	SOT457	6
SC-74 TSOP-6	ON Semi	SOT457	6
SC75	Infineon	DFN1006-3 (SOT883)	3
SC75	ON Semi	DFN1006-3 (SOT883)	3
SC-75	ON Semi	DFN1006-3 (SOT883)	3
SC-75	Semtech	DFN1006-3 (SOT883)	3
SC75A	Vishay	DFN1006-3 (SOT883)	3
SC-75A	Vishay	DFN1006-3 (SOT883)	3
SC79	Infineon	SOD523	2
SC-88	ON Semi	SOT363	6
SC88/SC 7 0-6/SOT 363 6 LEAD	ON Semi	SOT363	6
SC-88A	ON Semi	SOT353	5
SC89	Fairchild	SOT666	6
SC-89	Semtech	SOT666	6

Types with * show footprint compability only

Package cross reference list – Part 2

Type	Competitor	NXP	Pins / Leads
SC89-3	Vishay	DFN1006-3 (SOT883)	3
SC89-3	ON Semi	DFN1006-3 (SOT883)	3
SC89-3	Fairchild	DFN1006-3 (SOT883)	3
SC89-6	Vishay	SOT666	6
SC89-6	AOS	SOT666	6
SC89-6	Fairchild	SOT666	6
SC89-6lead	Vishay	SOT666	6
S-Flat	Toshiba	SOD123F	2
S-Flat	Toshiba	SOD123W	2
SLP1006P2	Semtech	DFN1006-2 (SOD882)	2
SLP1006P2T	Semtech	DFN1006D-2 (SOD882D)	2
SLP1006P3	Semtech	DFN1006-3 (SOT883)	3
SLP1006P3T	Semtech	DFN1006B-3 (SOT883B)	3
SLP1510N6	Semtech	DFN1410-6 (SOT886)	6
SLP1610N2	Semtech	DFN1608D-2 (SOD1608)	2
SLP1610P4	Semtech	DFN2510A-10 (SOT1176)	10
SLP1610P4	Semtech	DFN2520-9 (SOT1333)	9
SLP1616P6	Semtech	DFN1616-6 (SOT1189)	6
SLP1713P8	Semtech	DFN1714-8 (SOT1166)	8
SLP1713P8	Semtech	DFN1714U-8 (SOT983)	8
SLP2010P8T	Semtech	DFN2110-9 (SOT1178)	9
SLP2513P12	Semtech	DFN2512-12 (SOT1158)	12
SLP2513P12	Semtech	DFN2514-12 (SOT1167)	12
SLP2513P12	Semtech	DFN2514U-12 (SOT984)	12
SLP2626P10	Semtech	DFN2626-10 (SOT1197)	10
SLP3313P16	Semtech	DFN3314-16 (SOT1168)	16
SLP3313P16	Semtech	DFN3314U-16 (SOT985)	16
SM6 VS-6	Toshiba	SOT457	6
SMA flat	ST	SOD128	2
SMD TO-263	Renesas	D²PAK (SOT404)	3
SMD6/SMT6	Rohm	SOT457	6
SMD6/SMZ6	Rohm	SOT457	6
SMFPAK-6	Renesas	SOT666	6
S-Mini	Toshiba	SOT23	3
S-Mini TSM	Toshiba	SOT23	3
SMPAK	Renesas	DFN1006-3 (SOT883)	3
SMPC TO-277A	Vishay	CFP15 (SOT1289)	3
SMT3	Rohm	SOT23	3
SMT5*	Rohm	SOT457	6
SMT6	Rohm	SOT457	6
SMZ6/SMD6	Rohm	SOT457	6
SO-8 FL	ON Semi	LFPAK (SOT669)	5
SOD-123	ST	SOD123F	2
SOD-123-FL	ON Semi	SOD123F	2
SOD-123-FL	ON Semi	SOD123W	2
SOD323	Infineon	SOD323	2
SOD323	Vishay	SOD323	2
SOD323	Semtech	SOD323	2
SOD-323	ON Semi	SOD323	2
SOD-323	Diodes Inc.	SOD323	2
SOD-323	ST	SOD323	2
SOD523	Diodes Inc.	SOD523	2
SOD523	Vishay	SOD523	2
SOD523	Semtech	SOD523	2
SOD-523	ON Semi	SOD523	2
SOD-523	ST	SOD523	2
SOD882	ST	DFN1006-2 (SOD882)	2
SOD882T	ST	DFN1006D-2 (SOD882D)	2
SOD923-2*	ON Semi	DFN1006-2 (SOD882)	2
SOIC-8 NB	ON Semi	SOT96	8
SON 2x2	Texas Instruments	DFN2020MD-6 (SOT1220)	6
SON 3x3*	Texas Instruments	DFN2020MD-6 (SOT1220)	6
SOP8	Rohm	SOT96	8
SOP-8	Renesas	SOT96	8
SOPH	Rohm	SOT 108	14

Type	Competitor	NXP	Pins / Leads
SOT 143	Infineon	SOT143B	4
SOT063*	ON Semi	DFN101 OB-6 (SOT1216)	6
SOT-143	Semtech	SOT143B	4
SOT-143	Diodes Inc.	SOT143B	4
SOT223	Vishay	SOT223	4
SOT223	Infineon	SOT223	4
SOT223	Fairchild	SOT223	4
SOT223	ON Semi	SOT223	4
SOT223	Diodes Inc.	SOT223	4
SOT-223	ON Semi	SOT223	4
SOT-223	Diodes Inc.	SOT223	4
SOT23	Infineon	SOT23	3
SOT23	ST	SOT23	3
SOT23	Vishay	SOT23	3
SOT23	Semtech	SOT23	3
SOT23	Diodes Inc.	SOT23	3
SOT23	AOS	SOT23	3
SOT23	ON Semi	SOT23	3
SOT-23	ON Semi	SOT23	3
SOT-23	Diodes Inc.	SOT23	3
SOT23-3	Diodes Inc.	SOT23	3
SOT23-3	AOS	SOT23	3
SOT23-3	ON Semi	SOT23	3
SOT23-5	AOS	SOT457	6
SOT23-5	Diodes Inc.	SOT457	6
SOT23-6	Diodes Inc.	SOT457	6
SOT23-6	ST	SOT457	6
SOT23-6	Diodes Inc.	SOT457	6
SOT23-6L	Semtech	SOT457	6
SOT23F	Toshiba	SOT23	3
SOT26	Diodes Inc.	SOT457	6
SOT323	Infineon	SOT323	3
SOT323	Diodes Inc.	SOT323	3
SOT323	Fairchild	SOT323	3
SOT-323	Diodes Inc.	SOT323	3
SOT-323	ST	SOT323	3
SOT353	Diodes Inc.	SOT353	5
SOT353	Vishay	SOT353	5
SOT353	Diodes Inc.	SOT363	6
SOT363	Infineon	SOT363	6
SOT363	Diodes Inc.	SOT363	6
SOT-363	Diodes Inc.	SOT363	6
SOT523	Diodes Inc.	DFN1006-3 (SOT883)	3
SOT523F	Fairchild	DFN1006-3 (SOT883)	3
SOT-553	ON Semi	SOT665	5
SOT563	Diodes Inc.	SOT666	6
SOT-563	ON Semi	SOT666	6
SOT563-6	ON Semi	SOT666	6
SOT563F	Fairchild	SOT666	6
SOT666	Infineon	SOT666	6
SOT723*	ON Semi	DFN1010D-3 (SOT1215)	3
SOT723-3*	ON Semi	DFN1010D-3 (SOT1215)	3
SOT89	Infineon	SOT89	3
SOT89	Diodes Inc.	SOT89	3
SOT-89	ON Semi	SOT89	3
SOT89-3L	Diodes Inc.	SOT89	3
SOT963	ON Semi	DFN1010-6 (SOT891)	6
SOT963*	Diodes Inc.	DFN1010B-6 (SOT1216)	6
SOT963*	ON Semi	DFN1010E-6 (SOT1202)	6
SRP-F	Renesas	SOD123W	2
SS CSP2	Toshiba	DFN1006-3 (SOT883)	3
SSD3/SST3	Rohm	SOT23	3
SSM	Toshiba	DFN1006-3 (SOT883)	3
SSOT3	Fairchild	SOT23	3

Types with * show footprint compability only

Package cross reference list – Part 3

Type	Competitor	NXP	Pins / Leads
SSOT6	Fairchild	SOT457	6
SSOT6 FLMP	Fairchild	SOT457	6
SST3	Rohm	SOT23	3
SST3/SSD3	Rohm	SOT23	3
ST01005	STM	DSN0402-2 (SOD992)	2
Stmite flat	ST	SOD123W	2
T0263	Diodes Inc.	D²PAK(SOT404)	3
T0263-3	Infineon	D²PAK (SOT404)	3
Thin PowerPAK SC70	Vishay	DFN2020MD-6 (SOT1220)	6
Thin PowerPAK SC-70	Vishay	DFN2020-6 (SOT1118)	6
Thin PowerPAK SC-70	Vishay	DFN2020MD-6 (SOT1220)	6
Thin PowerPAK SC75*	Vishay	DFN2020MD-6 (SOT1220)	6
TLSP-6-1	Infineon	DFN1010E-6 (SOT1202)	6
TO-220S	Renesas	D²PAK (SOT404)	3
TO-220SM	Toshiba	D²PAK (SOT404)	3
TO-252 (MP-3ZK)	Renesas	DPAK (SOT428)	3
TO-252 reverse, TO-252	Vishay	DPAK (SOT428)	3
TO-252, TO-252 reverse	Vishay	DPAK (SOT428)	3
TO-252-3/-3-23	Infineon	DPAK (SOT428)	3
TO-263 3-lead	Vishay	D²PAK (SOT404)	3
TO-263AB	Vishay	D²PAK (SOT404)	3
TSLP-2-1	Infineon	DFN1006-2 (SOD882)	2
TSLP-2-7/-17	Infineon	DFN1006D-2 (SOD882D)	2
TSLP-3-1, -15	Infineon	DFN1006B-3 (SOT883B)	3
TSLP-3-4	Infineon	DFN1006-3 (SOT883)	3
TSLP-9-1	Infineon	DFN2510A-10 (SOT 1176)	10
TSLP-9-1	Infineon	DFN2520-9 (SOT1333)	9
TSMT5*	Rohm	SOT457	6
TSMT6	Rohm	SOT457	6
TSNP-2-2	Infineon	DFN1608D-2 (SOD 1608)	2
TSON Advance	Toshiba	DFN3333-8 (SOT873-1)	8
TSOP6	Vishay	SOT457	6
TSOP6	AOS	SOT457	6
TSOP6	ON Semi	SOT457	6
TSOP-6	Renesas	SOT457	6
TSOP-6/ TSOP6	Vishay	SOT457	6
TSSLP-2-1	Infineon	DSN0603-2 (SOD962)	2
TSSOP10	Infineon	SOT552	10
TSSOP20	Toshiba	SOT360	20
TSSOP20	Renesas	SOT360	20
TSSOP38	Infineon	SOT510	38
TSSOP-8	ON Semi	SOT505	8
TSST8*	Rohm	DFN2020MD-6 (SOT1220)	6
TUMT3	Rohm	SOT323	3
TUMT5*	Rohm	DFN2020-6 (SOT1118)	6
TUMT6*	Rohm	DFN2020-6 (SOT1118)	6
UDFN 1.6 x 1.6	ON Semi	DFN1616-6 (SOT1189)	6
UDFN 1.7 x 1.35, 0.4P	ON Semi	DFN1714U-8 (SOT983)	8
UDFN 10 2.5 x 1, 0.5P	ON Semi	DFN2520-9 (SOT1333)	9
UDFN 10 2.5 x 2	ON Semi	DFN2520-9 (SOT1333)	9
UDFN10 2.5 x 1, 0.5P	ON Semi	DFN2510A-10 (SOT1176)	10
UDFN10 2.6 x 2.6, 0.5P	ON Semi	DFN2626-10 (SOT1197)	10
UDFN12, 2.5 x 1.2, 0.4P	ON Semi	DFN2512-12 (SOT1158)	12
UDFN12, 2.5 x 1.35, 0.4P	ON Semi	DFN2512-12 (SOT1158)	12
UDFN12, 2.5 x 1.35, 0.4P	ON Semi	DFN2514-12 (SOT1167)	12
UDFN16, 3.3 x 1.35, 0.4P	Toshiba	DFN3314U-16 (SOT985)	16
UDFN16, 3.5 x 1.2, 0.4P	ON Semi	DFN3312-16 (SOT1159)	16
U-DFN2020-3 Type B 2.0 x 2.0 x 0.6	Diodes Inc.	DFN2020-3 (SOT1061)	3
U-DFN2020-6	Diodes Inc.	DFN2020MD-6 (SOT1220)	6
UDFN2020-6 Type B	Diodes Inc.	DFN2020-6 (SOT1118)	6
UDFN2020-6 Type E	Diodes Inc.	DFN2020MD-6 (SOT1220)	6
U-DFN2523-6*	Diodes Inc.	DFN2020MD-6 (SOT1220)	6
UDFN6	Toshiba	DFN2020-6 (SOT1118)	6
UDFN6	ON Semi	DFN2020MD-6 (SOT1220)	6

Type	Competitor	NXP	Pins / Leads
UDFN-6 WDFN6	ON Semi	DFN2020MD-6 (SOT1220)	6
UDFN6B	Toshiba	DFN2020MD-6 (SOT1220)	6
UDFN8, 1.8 x 1.2, 0.4P	ON Semi	DFN1712-8 (SOT1157)	8
UDRN 16 4 x 2	ON Semi	DFN4020-14 (SOT1334)	14
UF6	Toshiba	SOT363	6
UF6/ USV/ US6	Toshiba	SOT363	6
UFP	Renesas	SOD523	2
UMD2	Rohm	SOD323F	2
UMD3/UMT3	Rohm	SOT323	3
UMD5/UMT5	Rohm	SOT353	5
UMD6/ UMT6	Rohm	SOT363	6
UMLP 1.6 x 1.6*	Fairchild	DFN2020MD-6 (SOT1220)	6
UMT3	Rohm	SOT323	3
UMT3F*	Rohm	SOT323	3
UMT5/ UMD5	Rohm	SOT353	5
UMT6	Rohm	SOT363	6
UMT6/ UMD6	Rohm	SOT363	6
UPAK (SOT89)	Renesas	SOT89	3
URP	Renesas	SOD323	2
US6	Toshiba	SOT363	6
US6/ UF6/ USV	Toshiba	SOT363	6
use	Toshiba	SOD323	2
US-Flat	Toshiba	SOD323F	2
USM	Toshiba	SOT323	3
USV	Toshiba	SOT353	5
USV	Toshiba	SOT363	6
USV/ US6/ UF6/	Toshiba	SOT363	6
VESM*	Toshiba	DFN1010D-3 (SOT1215)	3
VML0806*	Rohm	DFN1006B-3 (SOT883B)	3
VMN2*	Rohm	DFN1006-2 (SOD882)	2
VMN2*	Rohm	DFN1006D-2 (SOD882D)	2
VMN3*	Rohm	DFN1006-3 (SOT883)	3
VMT3*	Rohm	DFN1010D-3 (SOT1215)	3
VMT6*	Rohm	DFN101 OB-6 (SOT1216)	6
VS6	Toshiba	SOT457	6
VSON-5	Renesas	SOT665	5
WDFN 10 2.5 x 2	ON Semi	DFN2520-9 (SOT1333)	9
WDFN 16 4 x 2	ON Semi	DFN4020-14 (SOT1334)	14
WDFN3	ON Semi	DFN2020-3 (SOT1061)	3
W-DFN3020-8*	Diodes Inc.	DFN2020-6 (SOT1118)	6
WDFN6	ON Semi	DFN2020-6 (SOT1118)	6
WDFN6	ON Semi	DFN2020MD-6 (SOT1220)	6
WEMT6	Rohm	SOT666	6
WEMT6/ EMT6/ EMD6	Rohm	SOT666	6
WLCSP 1 x 1*	Fairchild	WLCSP4	3
WLCSP1.6 x 1.6*	AOS	WLCSP6	6
WLCSP2	ON Semi	DSN0603-2 (SOD962)	2
WLCSP-4*	Fairchild	WLCSP4	3
WLCSP-4*	ON Semi	WLCSP4	3
WLL-2-2	Infineon	DSN0402-2 (SOD992)	2
WLP1.5x 1.5*	Texas Instruments	DFN2020MD-6 (SOT1220)	6
WLPI.Ox 1.0*	Texas Instruments	DFN1010D-3 (SOT1215)	3
WLPI.Ox 1.5*	Texas Instruments	DFN2020MD-6 (SOT1220)	6
X1 -DFN 1006-3	Diodes Inc.	DFN1006-3 (SOT883)	3
X1-DFN1212-3*	Diodes Inc.	DFN1010D-3 (SOT1215)	3
X1-DFN1616-6*	Diodes Inc.	DFN2020MD-6 (SOT1220)	6
X2-DFN0806-3	Diodes Inc.	DFN1006-3 (SOT883)	3
X2-DFN1006-2	Diodes Inc.	DFN1006D-2 (SOD882D)	2
X2-DFN1006-3	Diodes Inc.	DFN1006B-3 (SOT883B)	3
X2-DFN1310-6*	Diodes Inc.	DFN1010B-6 (SOT1216)	6
X2-DFN2015-3*	Diodes Inc.	DFN2020MD-6 (SOT1220)	6
X2-DFN2020-6	Diodes Inc.	DFN2020MD-6 (SOT1220)	6
X3-DFN0603-2	Diodes Inc.	DSN0603-2 (SOD962)	2
X3DFN-2	ON Semi	DSN0603-2 (SOD962)	2
XI-DFN1006-2	Diodes Inc.	DFN1006-2 (SOD882)	2

Types with * show footprint compability only

Package cross reference matrix – Part 1

Pins / leads	NXP	Industry standard names	Size (l x w x h) (mm)	P_{tot} (mW)	Package	Competitor synonyms								
						Rohm	Toshiba	ON Semi	Renesas	Infineon	Diodes Inc	ST	Vishay	Semtech
2	DSN0402-2 (SOD992)		0.4 x 0.2 x 0.12							WLL-2-2		ST01005		
	DSN1006-2 (SOD993)		1.0 x 0.6 x 0.3											
	DSN1006U-2 (SOD995)		1.0 x 0.6 x 0.3											
	DFN1006-2 (SOD882)		1.0 x 0.6 x 0.48	250		(VMN2)	CTS2 (fSC)	(SOD923-2)		TSLP-2-1	XI-DFN1006-2	SOD 882 uQFN-2L	LLP1006-2M LLP1006-2L	SLP1006P2
	DFN1006D-2 (SOD882D)		1.0 x 0.6 x 0.37	250		(VMN2)	CTS2 (fSC)	DSN2, 1.Ox 0.6		TSLP-2-7/ -17	X2-DFN1006-2	SOD882T	LLP1006-2L LLP1006-2M	SLP1006P2T
	DFN1608D-2 (SOD1608)		1.6 x 0.8 x 0.37	780		KMD2		DSN2 1.6 x 0.8		TSNP-2-2				SLP1610N2
	DSN0603-2 (SOD962)		0.6 x 0.3 x 0.3	525		GMD2	SC2	DSN2, X3DFN-2 WLCSP2	MP6	TSS-LP-2-1	X3-DFN0603-2	DFN2	CLP0603	SLP0603P2X3
	SOD80C	Mini-Melf	3.5 x 1.5 x 1.5	300		LLDS			LLD		MiniMelf	MiniMelf	MiniMelf	
	SOD123F		2.6 x 1.6 x 1.1	830			S-Flat	SOD-123-FL			PowerDI123	SOD-123		
	SOD123W		2.6 x 1.7 x 1.0	900		PMDU	S-Flat	SOD-123-FL	SRP-F		PowerDI123	Stmite flat		
	SOD128		3.8 x 2.5 x 1.0	1000		PMDT	M-Flat					SMA flat		
	SOD323	SC-76	1.7 x 1.25 x 0.95	400			USC	SOD-323	URP	SOD323	SOD-323	SOD-323	SOD323	SOD323
	SOD323F	SC-90	1.7 x 1.25 x 0.7	830		UMD2	US-Flat				PowerDI323			
	SOD523	SC-79	1.2 x 0.8 x 0.6	500		EMD2	ESC/ TESC	SOD-523	UFP	SC79	SOD523	SOD-523	SOD523	SOD523
3	CFP15 (SOT1289)		5.8 x 4.3 x 0.78	1200							PowerDi5		SMPC TO-277A	
	DFN1006-3 (SOT883)	SC-101	1.0 x 0.6 x 0.48	250			SS CSP2			TSLP-3-4	X1 -DFN 1006-3			SLP1006P3
	DFN1006B-3 (SOT883B)		1.0 x 0.6 x 0.37	250			CST3			TSLP-3-1, -15	X2-DFN1006-3			SLP1006P3T
	DFN1010D-3 (SOT1215)		1.1 x 1.0 x 0.37	325		(VMT3)	(VESM)	(SOT723)			(DFN1411)			
	DFN2020-3 (SOT1061)	HU-SON3	2.0 x 2.0 x 0.62	1300				WDFN3			U-DFN2020-3 Type B 2.0 x 2.0 x 0.6		PowerPAK SC706L	
	DFN2020D-3 (SOT1061D)		2.0 x 2.0 x 0.62	1300				WDFN3			U-DFN2020-3 Type B 2.0 x 2.0 x 0.6		PowerPAK SC706L	
	DPAK (SOT428)		6.6 x 6.1 x 2.3					DPAK	TO-252 (MP-3ZK)	TO-252-3/-3-2 3			TO-252,TO-252 reverse	
	D2PAK (SOT404)		11.0 x 11.0 x 4.3			LPDS/ LPTS	TO-220SM	D2PAK D2PAK 3	TO-220S / SMD TO-263 LDPAK(S)-(1)	T0263-3	T0263 (D2PAK)		TO-263 3-lead TO-263AB / D2PAK	
	SOT23		2.9 x 1.3 x 1.0	250		SSD3/ SST3	S-Mini TSM	SOT-23	MPAK	SOT23	SOT-23	SOT23	SOT23	SOT23
	SOT89	SC-62	4.5 x 2.5 x 1.5	1300		MPT3	PW-Mini	SOT-89	UPAK (SOT89)	SOT89	SOT89			SC-75
	SOT323	SC-70	2.0 x 1.25 x 0.95	200		UMD3/ UMT3 TUMT3	USM	SC-70	CMAK/ CMPAK	SOT323	SOT-323	SOT-323	SC-70 3 leads	
4	LFPAK56 (SOT669)	Power-S08	4.9 x 4.45 x 1.0	3000				SO-8 FL	LFPAK	PG-TD-SON-8	Power-DI5060-8	PowerFLAT (6x5)	PowerPAK SO-8	
	SOT143B		2.9 x 1.3 x 1.0	250			CP4		MPAK-4R	SOT143	SOT-143			SOT-143
	SOT223	SC-73	6.5 x 3.5 x 1.65	1700				SOT-223		SOT223	SOT-223		SOT223	

Types in brackets (...) show footprint compatibility only

Package cross reference matrix – Part 2

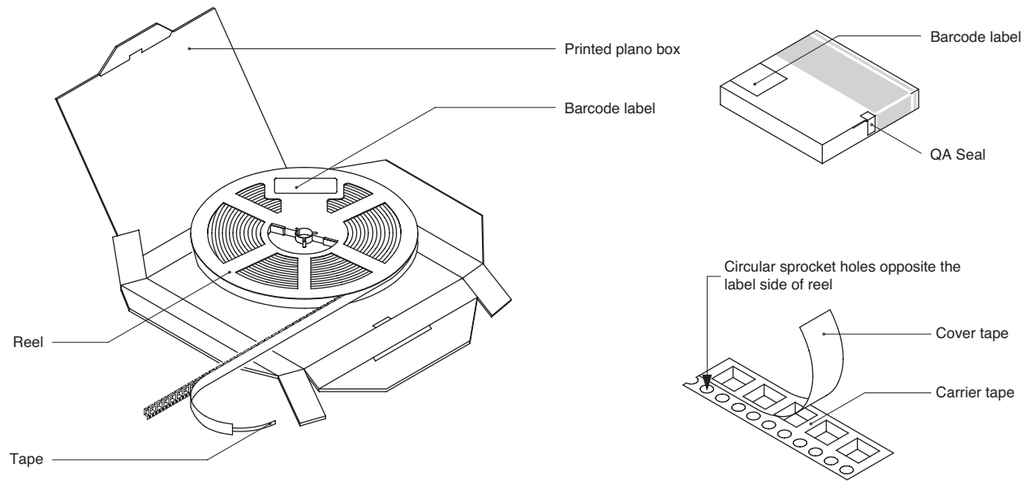
Pins / leads	NXP	Industry standard names	Size (l x w x h) (mm)	P_{tot} (mW)	Package	Competitor synonyms								
						Rohm	Toshiba	ON Semi	Renesas	Infineon	Diodes Inc	ST	Vishay	Semtech
5	SOT753		2.9 x 1.5 x 1.0											
	SOT353	SC-88 A	2.0 x 1.25 x 0.95	300		UMD5/ UMT5	USV	SC-88 A	CMPAK-5C0		SOT353		SOT353	SC70-5L
	SOT665		1.6 x 1.2 x 0.55	300		EMD5/ EMT5	ESV	SOT-553	VSON-5					
6	DFN1010-6 (SOT891)	x SON6	1.0 x 1.0 x 0.48				CS6	SOT963						
	DFN1010B-6 (SOT1216)		1.1 x 1.0 x 0.37	350		(VMT6)	(FS6)	(SOT063)			(SOT963)			
	DFN1010E-6 (SOT1202)							(SOT963)		TLSP-6-1				
	DFN1410-6 (SOT886)	x SON6	1.45 x 1.0 x 0.48	250										SLP1510N6
	DFN1616-6 (SOT1189)	H x SON6	1.6 x 1.6 x 0.48					UDFN 1.6 x 1.6					LLP75-/L	SLP1616P6
	DFN2020-6 (SOT1118)		2.0 x 2.0 x 0.62	1300		HU-ML2020L8 (Dual)	UDFN6	6 Lead DFN WDFN6			UDFN2020-6 Type B		PowerPAK SC-70 Thin PowerPAK SC-70	
	DFN2020D-6 (SOT1118D)		2.0 x 2.0 x 0.62	1300		HU-ML2020L8 (Dual)	UDFN6	6 Lead DFN WDFN6			UDFN2020-6 Type B		PowerPAK SC-70 Thin PowerPAK SC-70	
	DFN2020MD-6 (SOT1220)		2.0 x 2.0 x 0.62	1250		HU-ML2020L8 (Single)	UDFN6B	UDFN-6 WDFN6			UDFN2020-6 Type E		PowerPAK SC-70 Thin PowerPAK SC-70	
	LFPAK56D (SOT1205)		4.9 x 4.45 x 1.0	3000								PowerFLAT (6x5)		
	SOT363	SC-88	2.0 x 1.25 x 0.95	300		UMD6/ UMT6	US6 UF6 USV	SC-88	CMPAK-6	SOT363	SOT-363		SC70-6	SC70-6L
	SOT457	SC-74	2.9 x 1.5 x 1.0	750		SMD6/ SMT6	SM6 VS-6	SC-74 TSOP-6	TSOP-6	SC74 TSOP6	SOT23-6 SOT26		TSOP6 TSOP-6	SOT23-6L
	SOT666		1.6 x 1.2 x 0.55	300		EMD6/ EMT6 WEMT6	ES6 ESV	SOT-563	SMFPAK-6	SOT666	SOT563		SC89-6lead	SC-89
8	SOT96	S08	4.9 x 3.9 x 1.75	1500		SOP8	FM8	SOIC-8 NB	SOP-8				S08	
	SOT505	TSSOP8	3.0 x 3.0 x 1.1					TSSOP-8						
	DFN1712-8 (SOT1157)	H x SON8	1.7 x 1.2 x 0.48					UDFN8, 1.8 x 1.2, 0.4P						
	DFN1714-8 (SOT 1166)	HUSON8	1.7 x 1.35 x 0.52											SLP1713P8
	DFN1714U-8 (SOT983)	H x SON8	1.7 x 1.35 x 0.48					UDFN 1.7 x 1.35, 0.4P						SLP1713P8
9	DFN2110-9 (SOT1178)	x SON9	2.1 x 1.0 x 0.48											SLP2010P8T
	DFN2520-9 (SOT1333)							WDFN 10 2.5 x 2 UDFN10 2.5 x 2						
10	DFN2510-10 (SOT 1165)	x SON10	2.5 x 1.0 x 0.48					UDFN10 2.5 x 1, 0.5P		TSLP-9-1		pQFN-10L		SLP1610P4
	DFN2510A-10 (SOT1176)	x SON10	2.5 x 1.0 x 0.48					UDFN10 2.5 x 1, 0.5P		TSLP-9-1		pQFN-10L		SLP1610P4
	SOT552	TSSOP10	3.0 x 3.0 x 1.1					Micro 10		TSSOP10				MSOP-10L
	DFN2626-10 (SOT 1197)		2.6 x 2.6 x 0.48					UDFN10 2.6 x 2.6, 0.5P						SLP2626P10

Package cross reference matrix – Part 3

Pins / leads	NXP	Industry standard names	Size (l x w x h) (mm)	P_{tot} (mW)	Package	Competitor synonyms								
						Rohm	Toshiba	ON Semi	Renesas	Infineon	Diodes Inc	ST	Vishay	Semtech
12	DFN2512-12 (SOT 1158)	H x - SON12	2.5 x 1.2 x 0.48					UDFN12, 2.5 x 1.2, 0.4P						
	DFN2514-12 (SOT 1167)	HU-SON12	2.5 x 1.35 x 0.53					UDFN12, 2.5 x 1.35, 0.4P						SLP2513P12
	DFN2514U-12 (SOT984)	H x - SON12	2.5 x 1.35 x 0.48											SLP2513P12
14	DFN4020-14 (SOT 1334)		4.0 x 2.0 x 0.48					WDFN 16 4 x 2 UDRN 16 4 x 2						
	SOT 108	S014	8.65 x 3.9 x 1.75			SOP 14				DS014				
16	DFN3312-16 (SOT 1159)	H x - SON16	3.3 x 1.2 x 0.48					UDFN 16, 3.5 x 1.2, 0.4P						
	DFN3314-16 (SOT 1168)	HU-SON16	3.3 x 1.35 x 0.53											SLP3313P16
	DFN3314U-16 (SOT985)	H x - SON16	3.3 x 1.35 x 0.48					UDFN 16, 3.3 x 1.35, 0.4P						SLP3313P16
20	SOT360	TSSOP20	6.5 x 4.4 x 1.1					TSSOP20		TSSOP20				
38	SOT510	TSSOP38	9.7 x 4.4 x 1.1							TSSOP38				

Types in brackets (…) show footprint compatibility only

Tape and reel pack for SMD and WLCSP packages



Product orientation (tape and reel pack)

2 pin packages

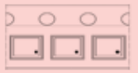
Orientation in tape	Package	Packing 12NC ending
	DFN1006-2 (SOD882)	315
	DFN1006D-2 (SOD882D)	315
	DFN1608D-2 (SOD1608)	315
	DSN0603-2 (SOD962)	315
	DSN0402-2 (SOD992)	315
	DSN1006-2 (SOD993)	315
	DSN1006U-2 (SOD995)	315
	SOD80	115, 135
	SOD123F	115
	SOD123W	115
	SOD128	115
	SOD523	115, 135, 315, 335

3 pin packages

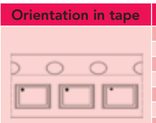
Orientation in tape	Package	Packing 12NC ending
	SOT89	146

Orientation in tape	Package	Packing 12NC ending
	DFN1006-3 (SOT883)	315
	DFN1006B-3 (SOT883B)	315
	SOT23	185, 215, 235
	SOT323	115, 135
	SOT416	115, 135

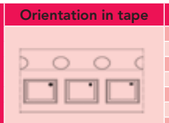
Orientation in tape	Package	Packing 12NC ending
	DFN1010D-3 (SOT1215)	147
	DFN2020-3 (SOT1061)	115, 135
	DFN2020D-3 (SOT1061D)	115,135
	SOT89	115,135
	SOT663	115
	CFP15 (SOT1289)	139, 145
	DPAK (SOT428)	118
	D2PAK (SOT404)	118

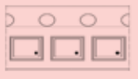
Orientation in tape	Package	Packing 12NC ending
	SOT89	147

4 pin packages

Orientation in tape	Package	Packing 12NC ending
	LFPAK33 (SOT1210)	115
	LFPAK56 (SOT669)	115

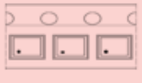
Orientation in tape	Package	Packing 12NC ending
	SOT143B	215, 235
	SOT223	115, 135
	DFN1010-4 (SOT1194)	115

Orientation in tape	Package	Packing 12NC ending
		

Orientation in tape	Package	Packing 12NC ending
		

5 pin packages

Orientation in tape	Package	Packing 12NC ending
		

Orientation in tape	Package	Packing 12NC ending
	SOT753	125

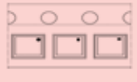
Orientation in tape	Package	Packing 12NC ending
	SOT353	115, 135
	SOT665	115

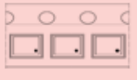
Orientation in tape	Package	Packing 12NC ending
		

6 pin packages

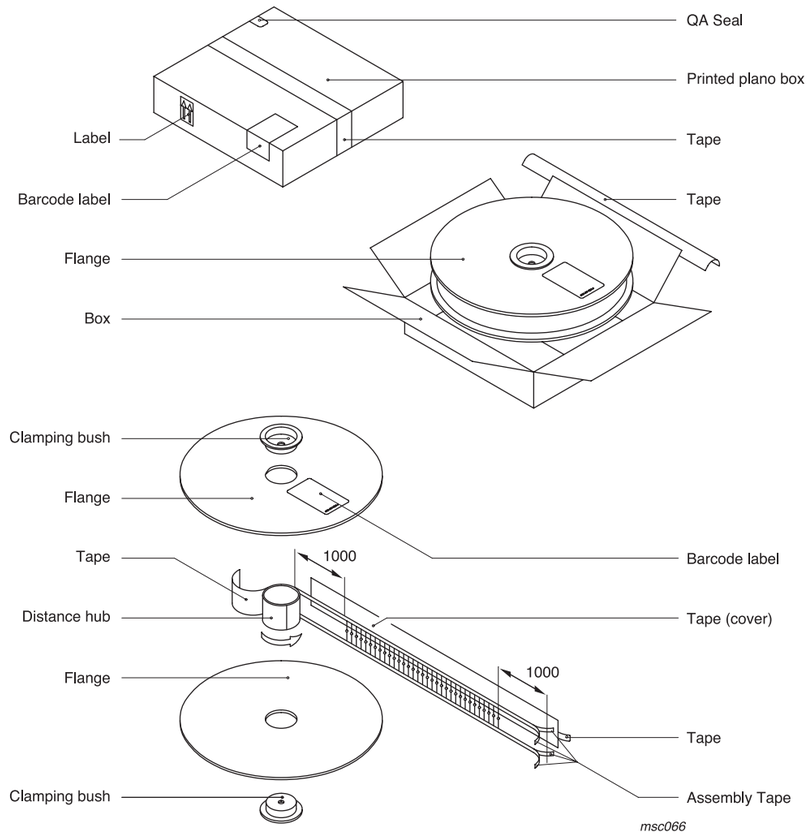
Orientation in tape	Package	Packing 12NC ending
	DFN1410-6 (SOT886)	115
	DFN1616-6 (SOT1189)	115
	DFN2020MD-6 (SOT1220)	184
	LFPAK56D (SOT1205)	115

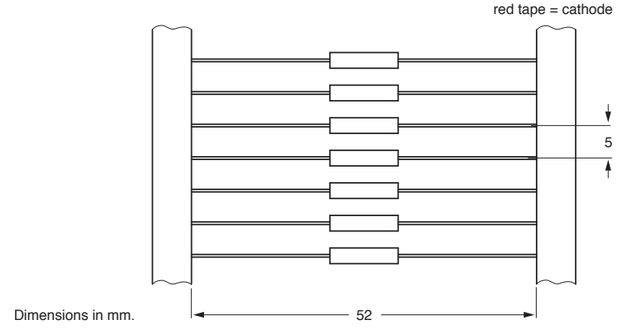
Orientation in tape	Package	Packing 12NC ending
	DFN1010-6 (SOT891)	132
	DFN1010E-6 (SOT1202)	132
	DFN1410-6 (SOT886)	132
	DFN2020MD-6 (SOT1220)	125
	SOT363	125, 165
	SOT457	125, 165

Orientation in tape	Package	Packing 12NC ending
	DFN2020-6 (SOT1118)	115
	DFN2020D-6 (SOT1118D)	115
	DFN2020MD-6 (SOT1220)	115
	SOT363	115, 135
	SOT457	115, 135
	SOT666	115, 315

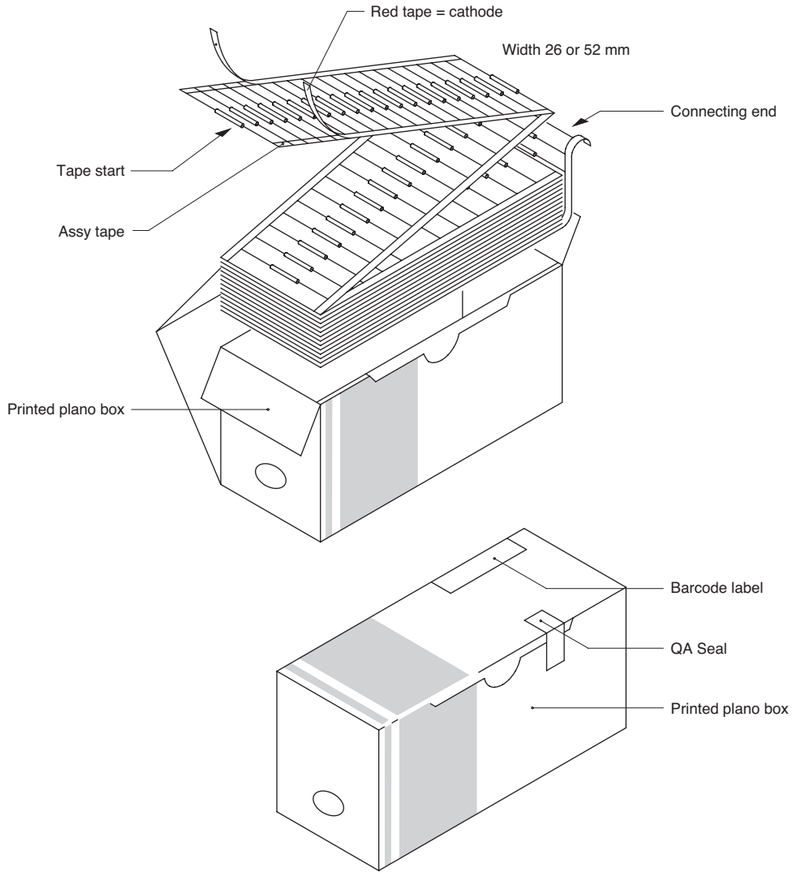
Orientation in tape	Package	Packing 12NC ending
		

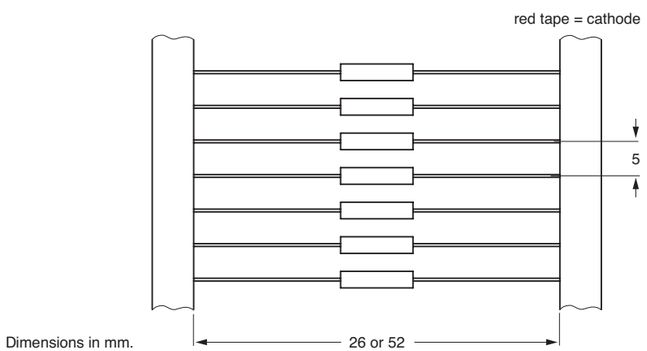
Reel pack axial tape for glass diodes





Ammo pack axial tape for glass diodes

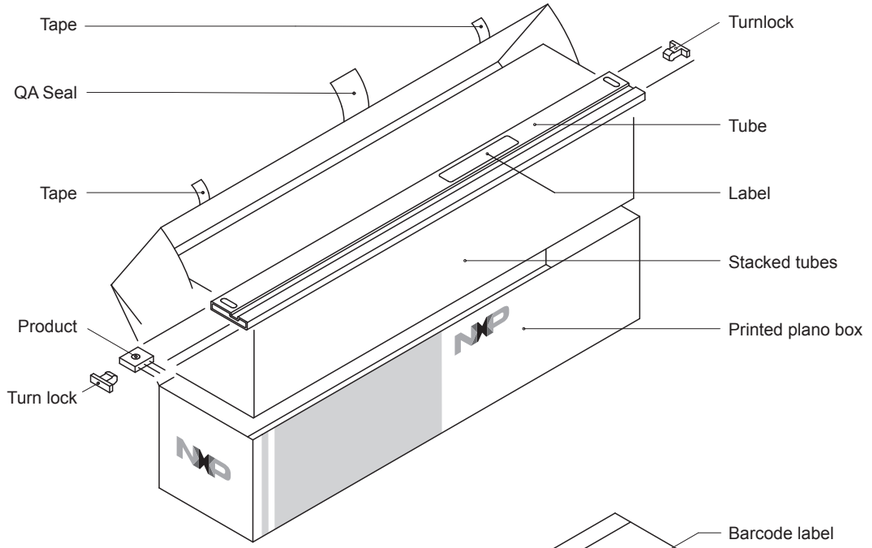


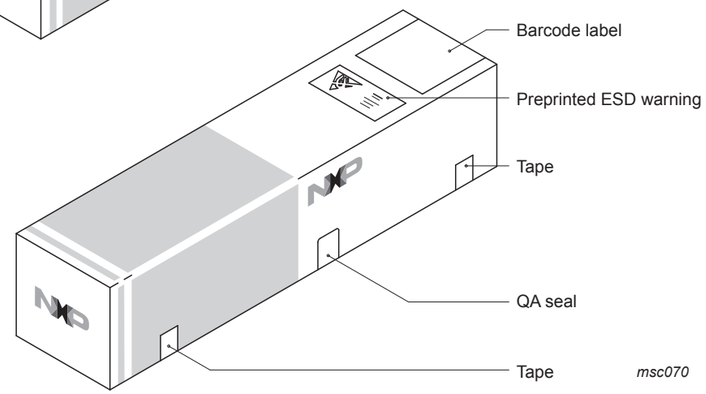


Tube pack for through hole packages

Item	Material	Weight (1) (g)
Printed plano box	Cardboard carbon coated	155.00
Tape	Polypropylene	0.10
Labels	Paper	28.71
Tube	Polyvinylchloride	720.00
Turnlock	Polyamide	24.00
Seal	Acrylate	0.15

(1) For SOT78

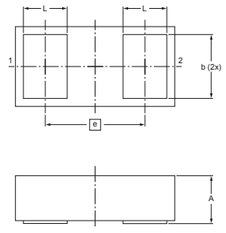




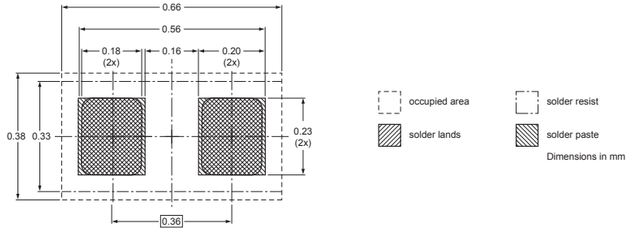
msc070

Outline and footprint drawings

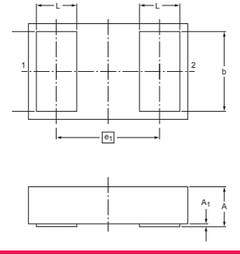
2-pin SMD packages



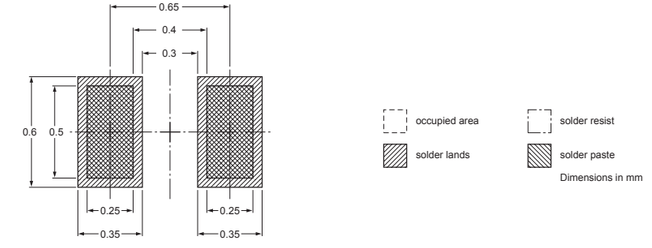
DSN0402-2 (SOD992)



DSN0402-2 (SOD992)



DSN1006-2 (SOD993)



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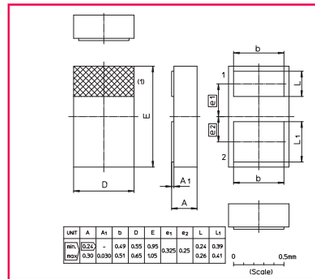

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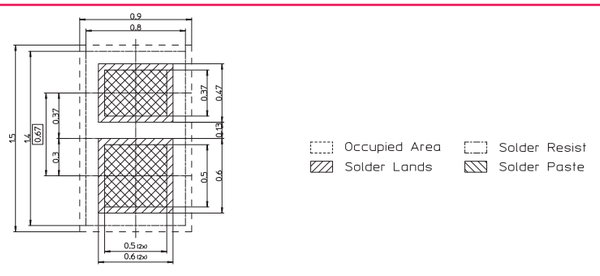

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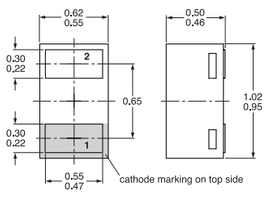
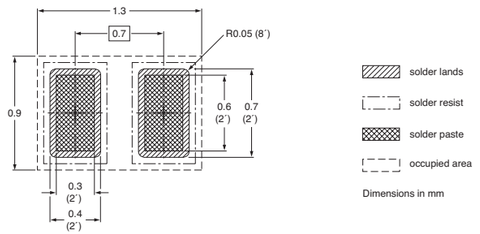


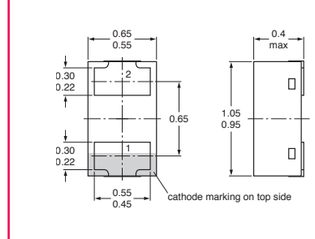
DFN1006-2 (SOD882)



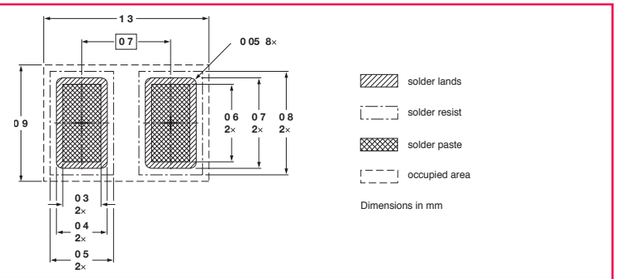
DFN1006-2 (SOD882)

Dimensions in mm

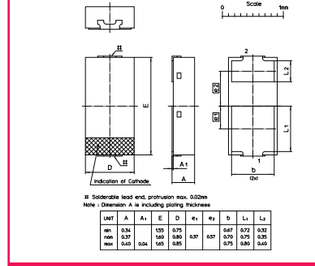
2-pin SMD packages



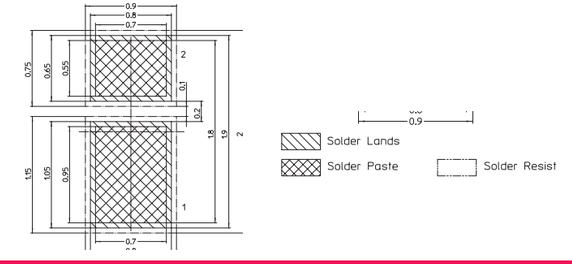
DFN1006D-2 (SOD882D)



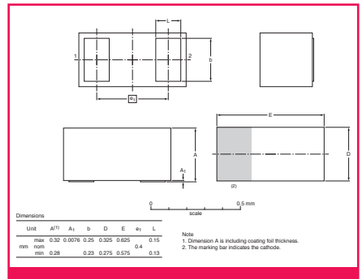
DFN1006D-2 (SOD882D)



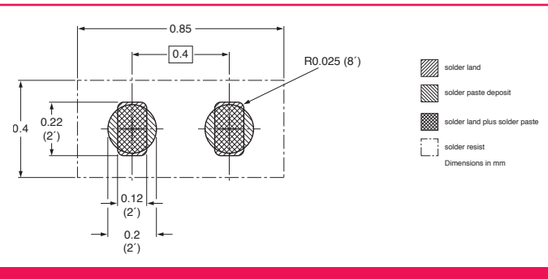
DFN1608D-2 (SOD1608)



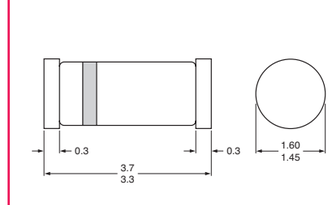
DFN1608D-2 (SOD1608)



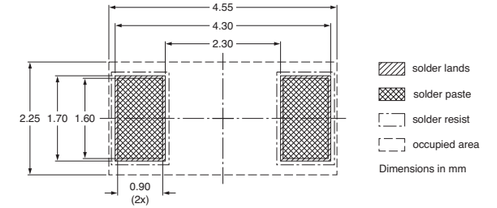
DSN0603-2 (SOD962)



DSN0603-2 (SOD962) and DSN0603B-2 (SOD962B)



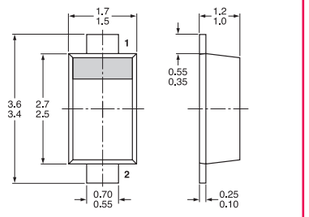
SOD80C



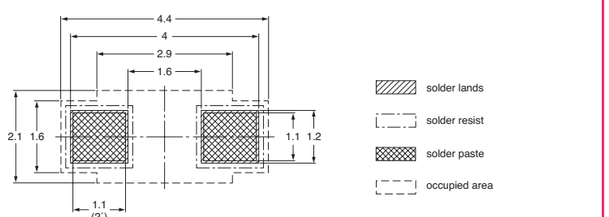
SOD80C

Dimensions in mm

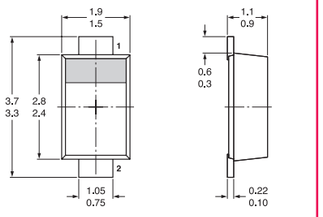
2-pin SMD packages



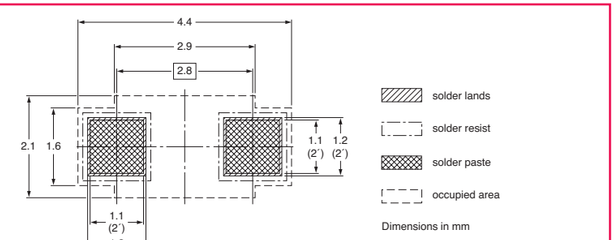
SOD123F



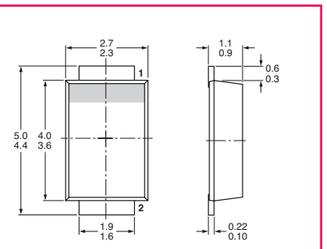
SOD123F



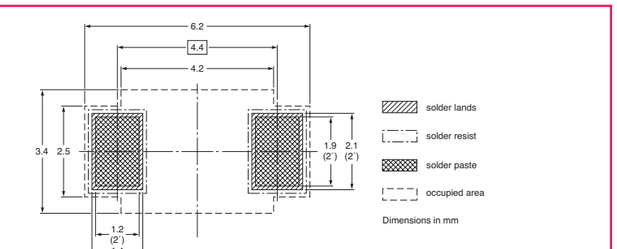
SOD123W



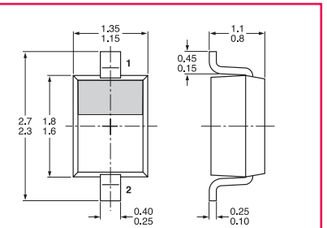
SOD123W



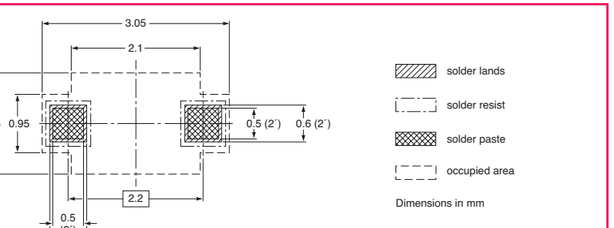
SOD128



SOD128



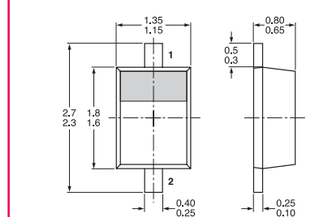
SOD323 (SC-76)



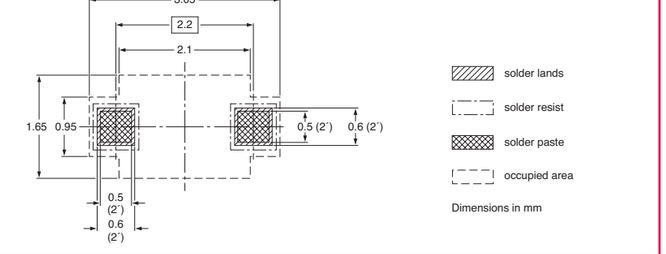
SOD323 (SC-76)

Dimensions in mm

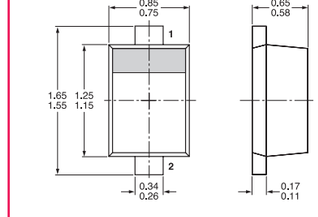
2-pin SMD packages



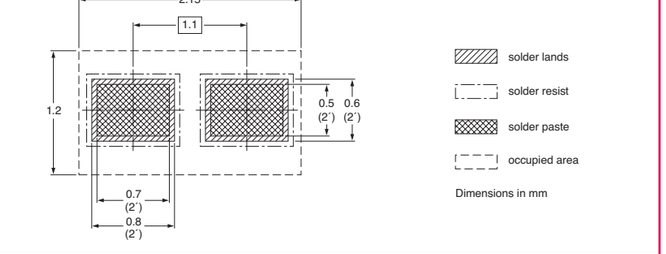
SOD323F (SC-90)



SOD323F (SC-90)

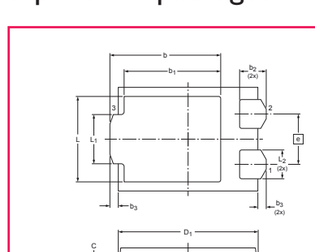


SOD523 (SC-79)

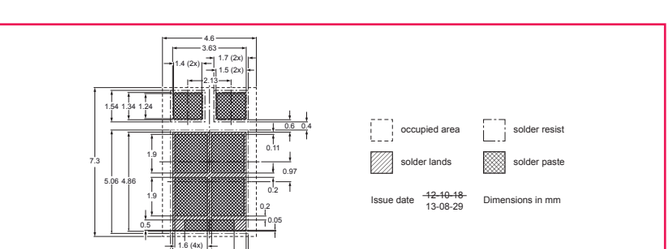


SOD523 (SC-79)

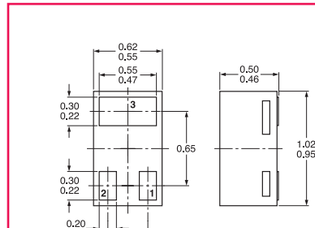
3-pin SMD packages



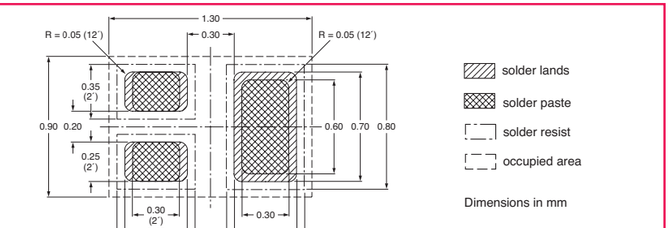
CFP15 (SOT1289)



CFP15 (SOT1289)



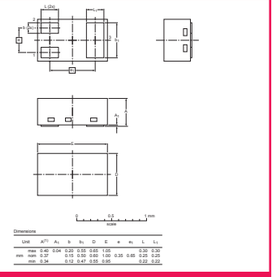
DFN1006-3 (SOT883)



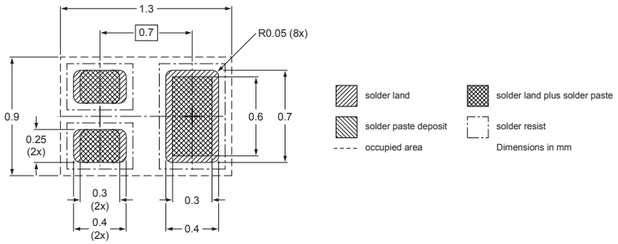
DFN1006-3 (SOT883)

Dimensions in mm

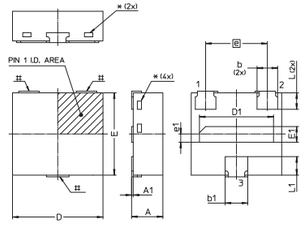
3-pin SMD packages



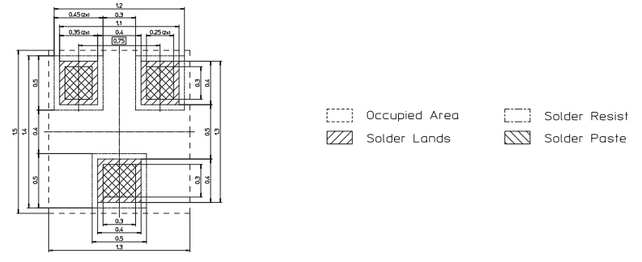
DFN1006B-3 (SOT883B)



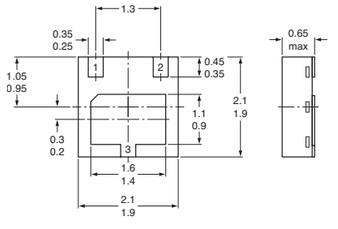
DFN1006B-3 (SOT883B)



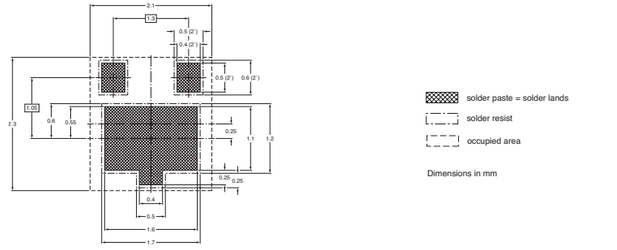
DFN1010D-3 (SOT1215)



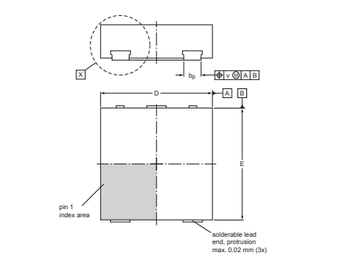
DFN1010D-3 (SOT1215)



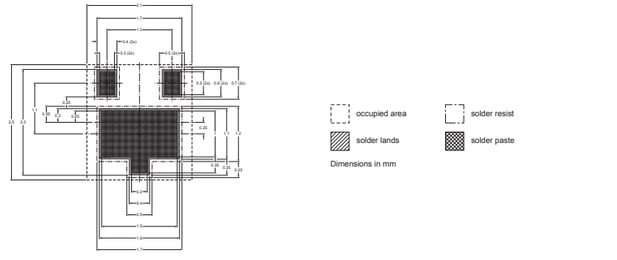
DFN2020-3 (SOT1061)



DFN2020-3 (SOT1061)



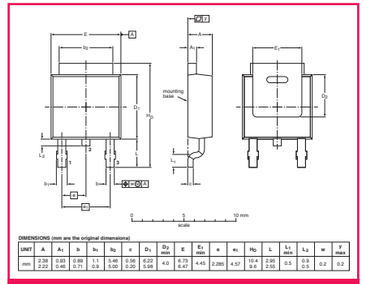
DFN2020D-3 (SOT1061D)



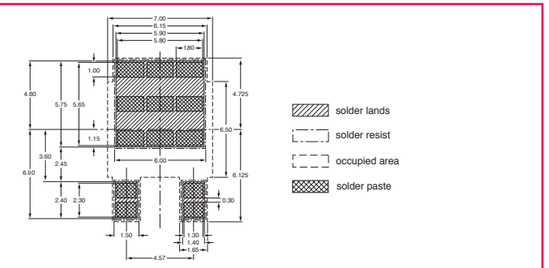
DFN2020D-3 (SOT1061D)

Dimensions in mm

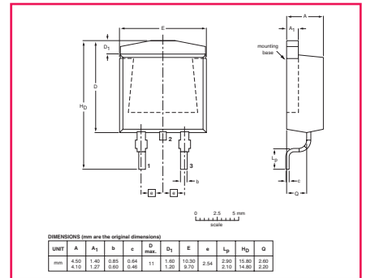
3-pin SMD packages



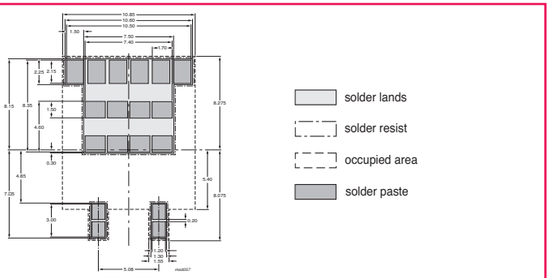
DPAK (SOT428)



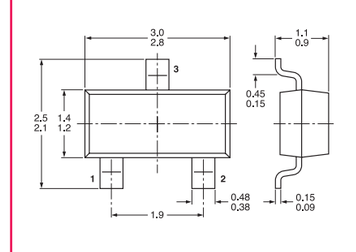
DPAK (SOT428)



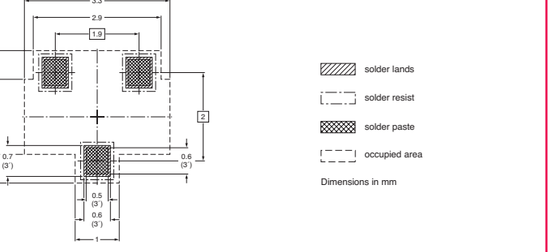
D²PAK (SOT404)



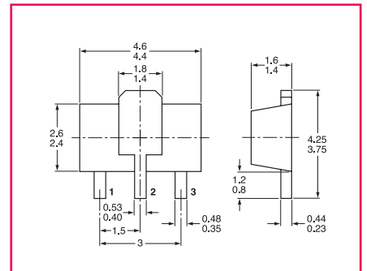
D²PAK (SOT404)



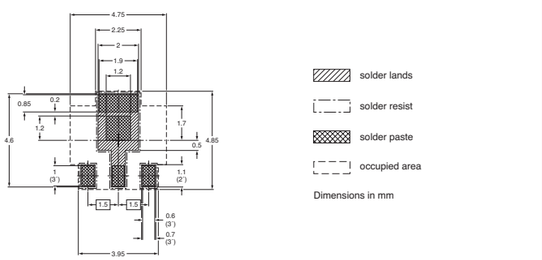
SOT23



SOT23



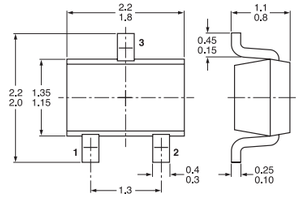
SOT89 (SC-62)



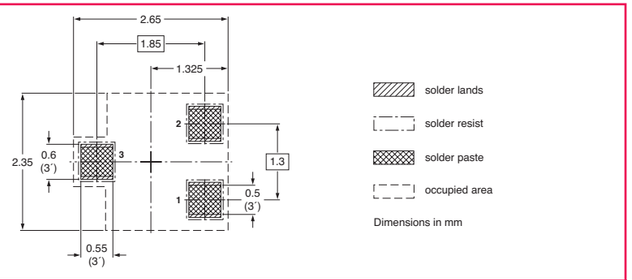
SOT89 (SC-62)

Dimensions in mm

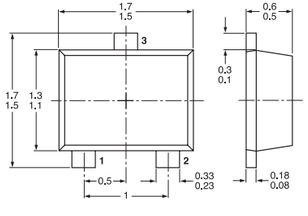
3-pin SMD packages



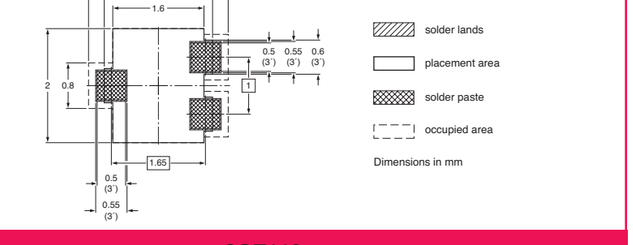
SOT323 (SC-70)



SOT323 (SC-70)

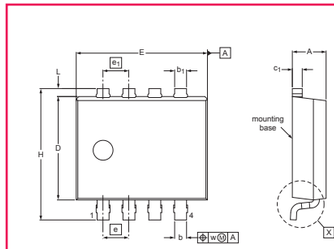


SOT663

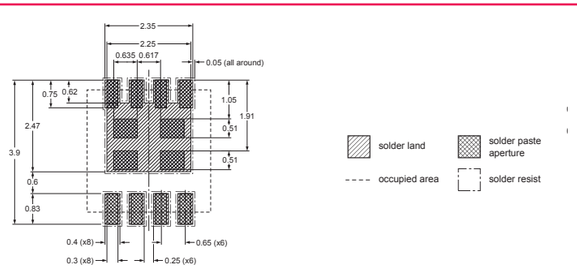


SOT663

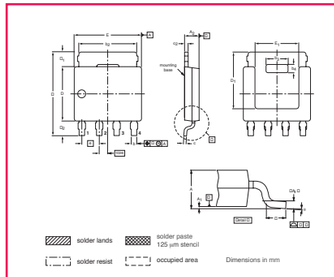
4-pin SMD packages



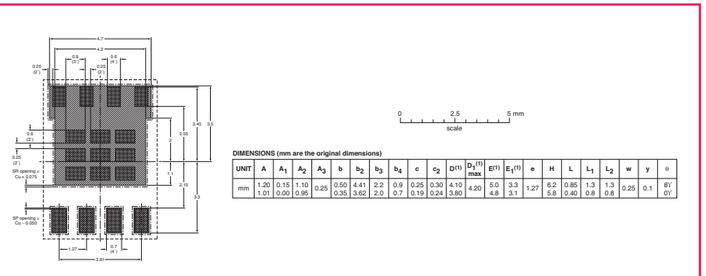
LFPAK33 (SOT1210)



LFPAK33 (SOT1210)



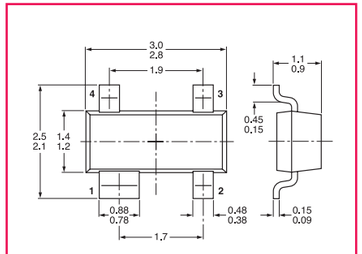
LFPAK56 (SOT669)



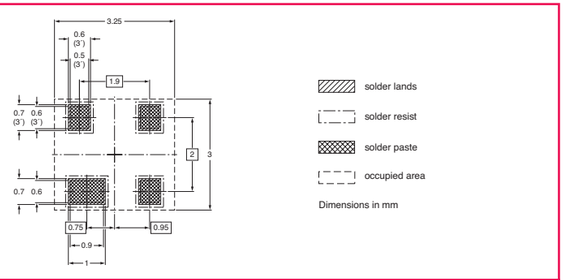
LFPAK56 (SOT669)

Dimensions in mm

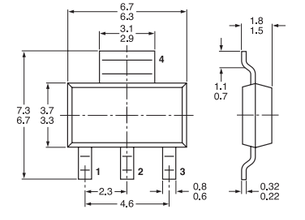
4-pin SMD packages



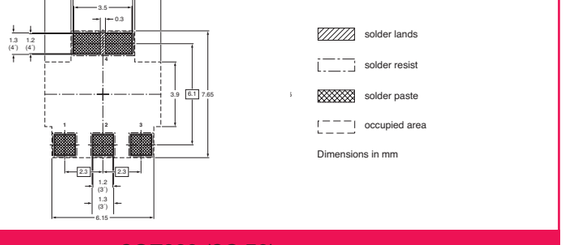
SOT143B



SOT143B

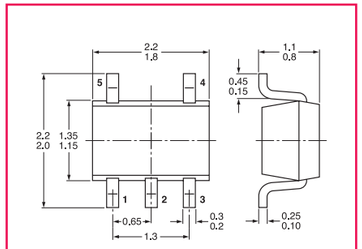


SOT223 (SC-73)

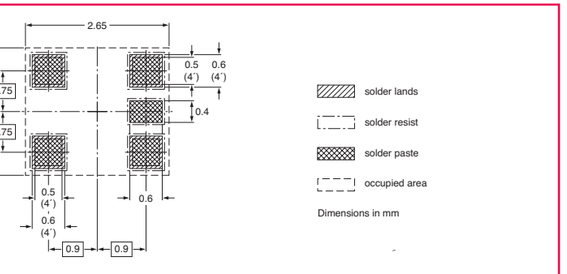


SOT223 (SC-73)

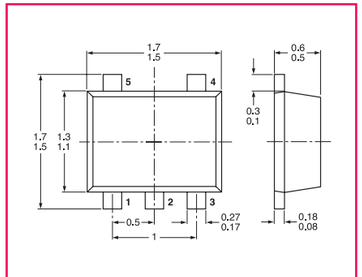
5-pin SMD packages



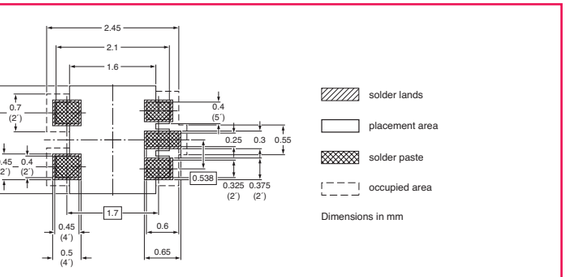
SOT353 (SC-88A)



SOT353 (SC-88A)



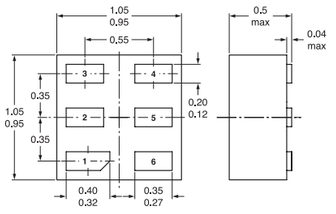
SOT665



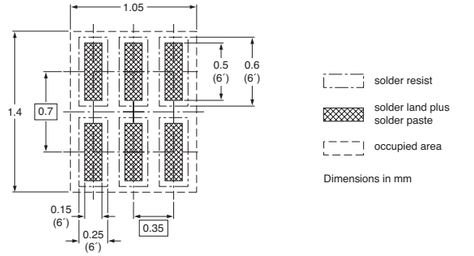
SOT665

Dimensions in mm

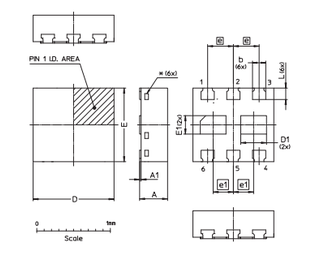
6-pin SMD packages



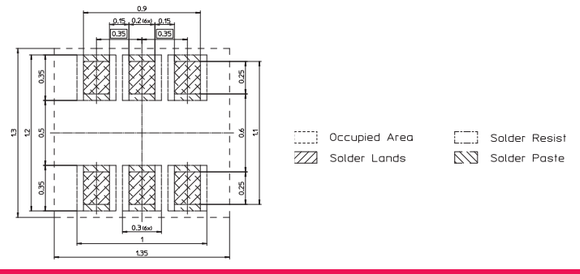
DFN1010-6 (SOT891)



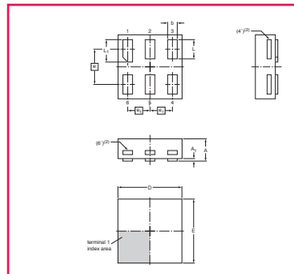
DFN1010-6 (SOT891)



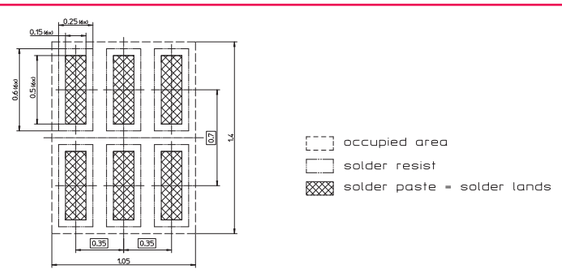
DFN1010B-6 (SOT1216)



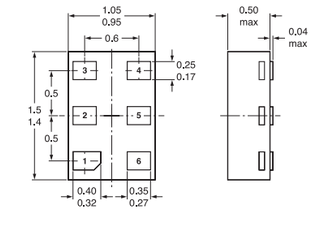
DFN1010B-6 (SOT1216)



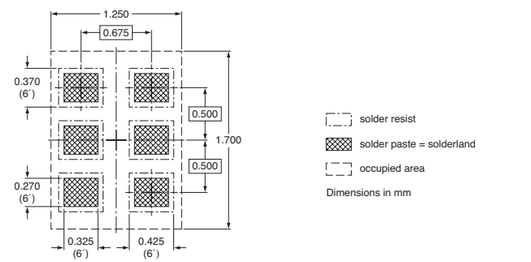
DFN1010E-6 (SOT1202)



DFN1010E-6 (SOT1202)



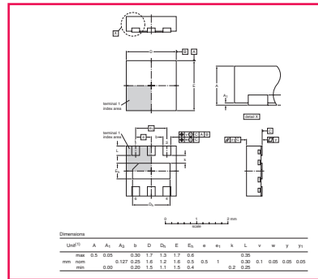
DFN1410-6 (SOT886)



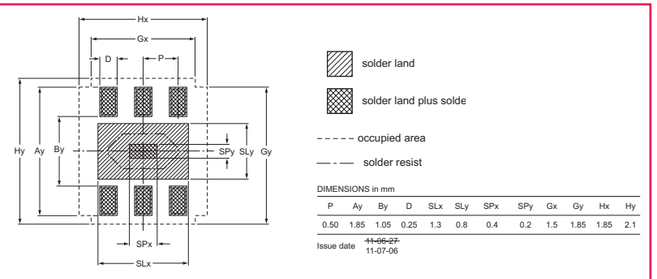
DFN1410-6 (SOT886)

Dimensions in mm

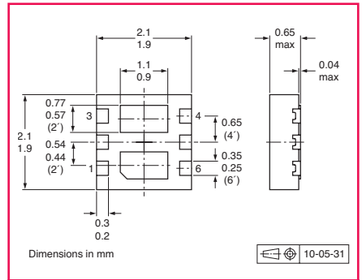
6-pin SMD packages



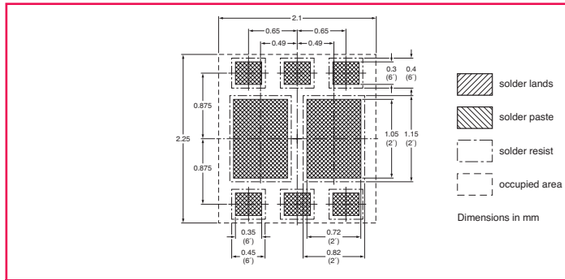
DFN1616-6 (SOT1189)



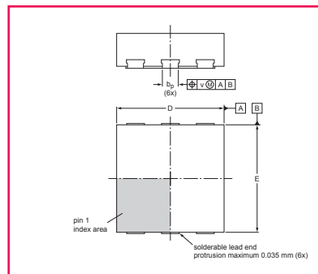
DFN1616-6 (SOT1189)



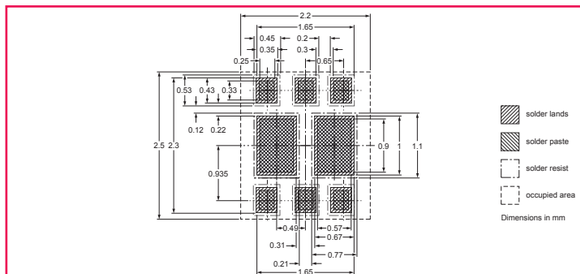
DFN2020-6 (SOT1118)



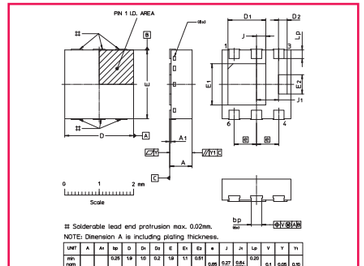
DFN2020-6 (SOT1118)



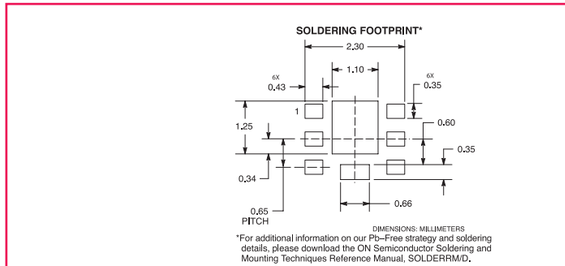
DFN2020D-6 (SOT1118D)



DFN2020D-6 (SOT1118D)



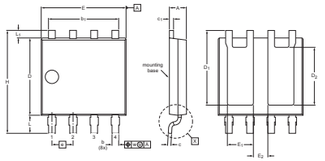
DFN2020MD-6 (SOT1220)



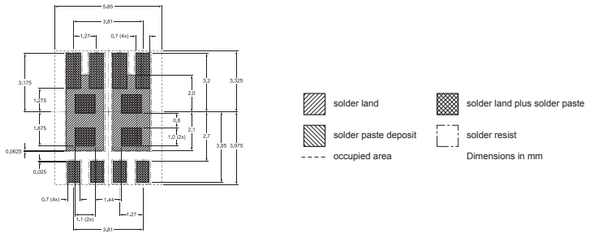
DFN2020MD-6 (SOT1220)

Dimensions in mm

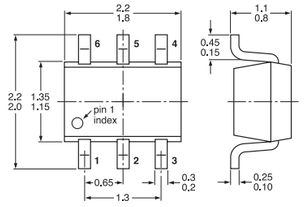
6-pin SMD packages



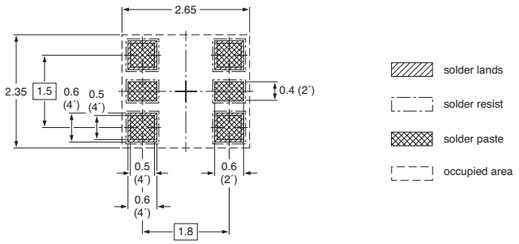
LFPAK56D (SOT1205)



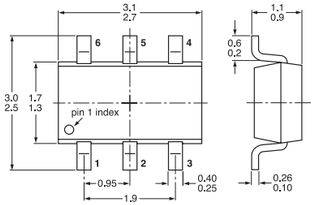
LFPAK56D (SOT1205)



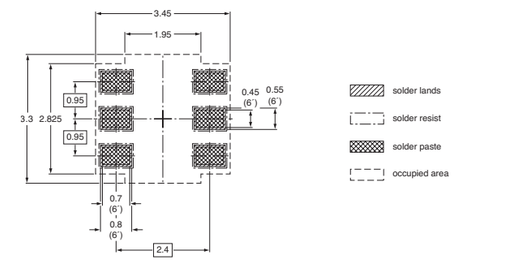
SOT363 (SC-88)



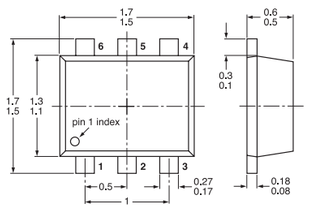
SOT363 (SC-88)



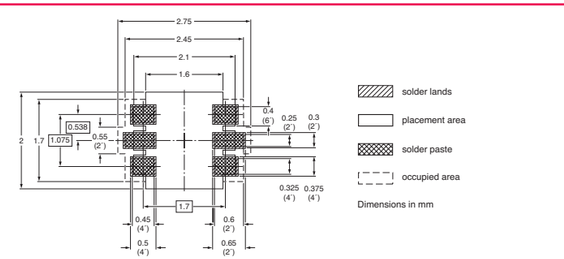
SOT457 (SC-74)



SOT457 (SC-74)



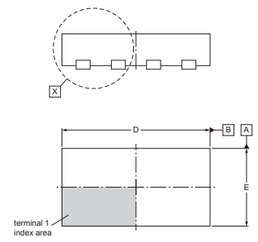
SOT666



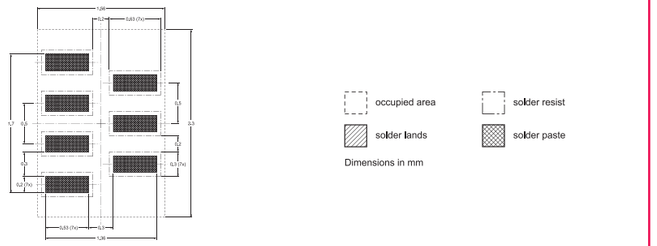
SOT666

Dimensions in mm

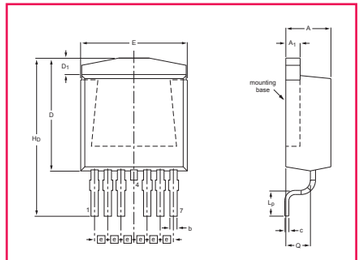
7-pin SMD packages



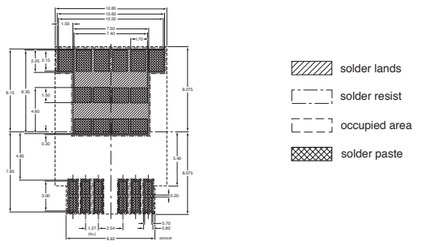
DFN2111-7 (SOT1358)



DFN2111-7 (SOT1358)

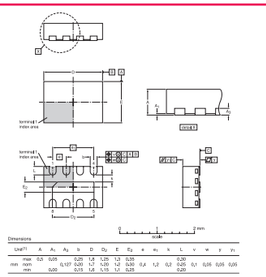


D2PAK-7 (SOT428)

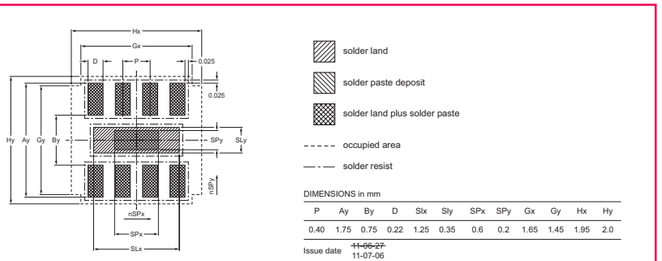


D2PAK-7 (SOT428)

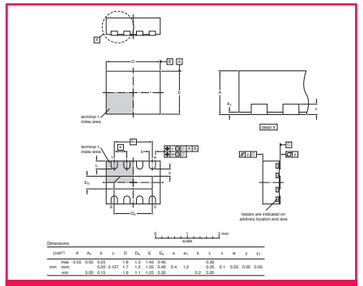
8-pin SMD packages



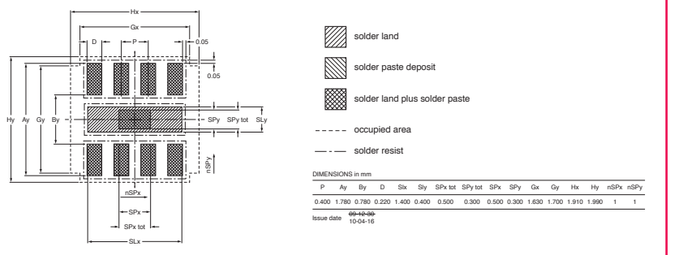
DFN1712-8 (SOT1157)



DFN1712-8 (SOT1157)



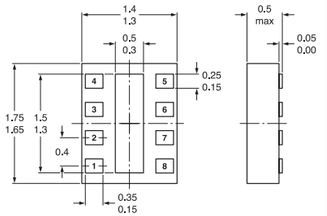
DFN1714-8 (SOT1166)



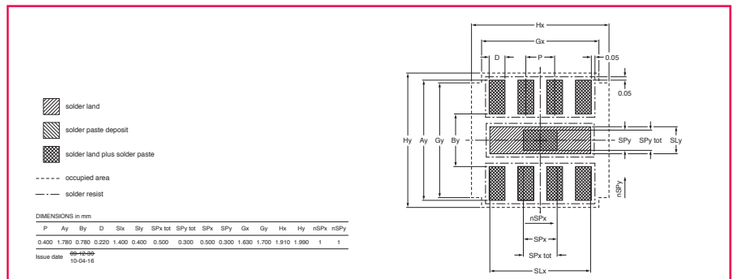
DFN1714-8 (SOT1166)

Dimensions in mm

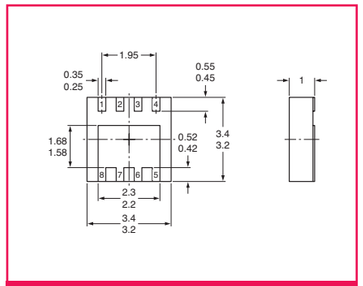
8-pin SMD packages



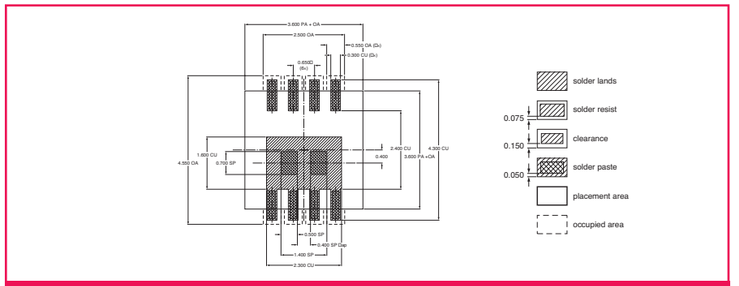
DFN1714U-8 (SOT983)



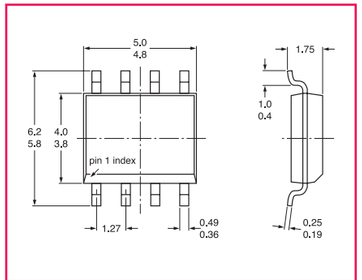
DFN1714U-8 (SOT983)



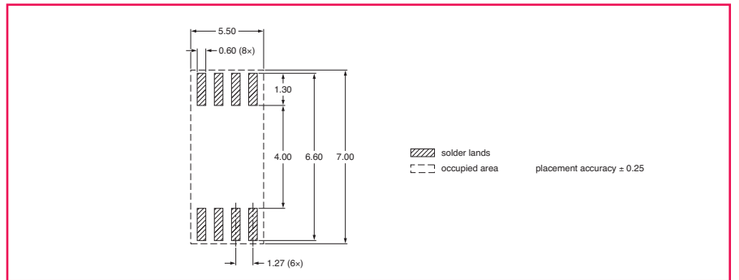
DFN3333-8 (SOT873-1)



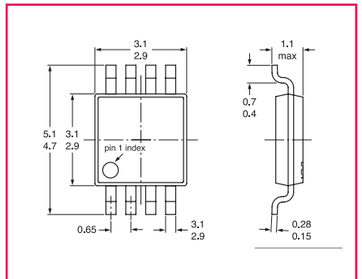
DFN3333-8 (SOT873-1)



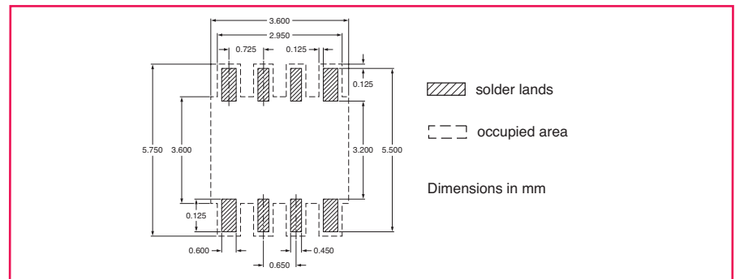
SOT96 (SO8)



SOT96 (SO8)



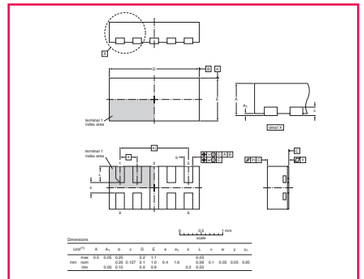
SOT505 (TSSOP8)



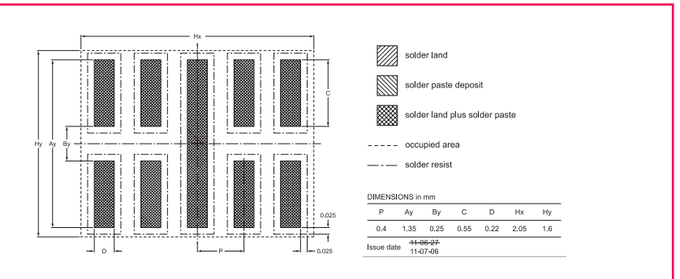
SOT505 (TSSOP8)

Dimensions in mm

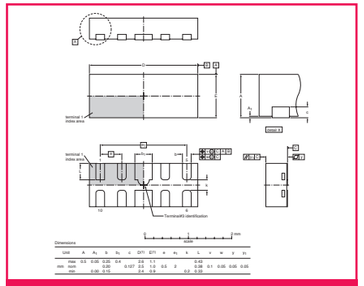
More than 8-pin SMD packages



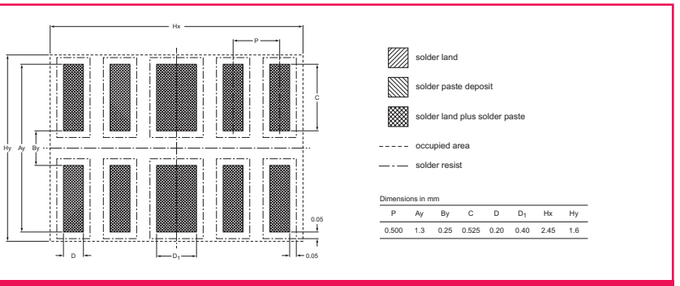
DFN2110-9 (SOT1178)



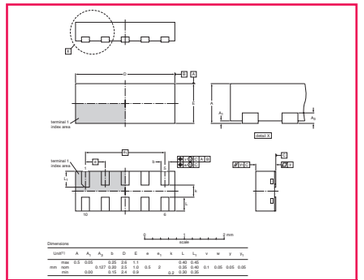
DFN2110-9 (SOT1178)



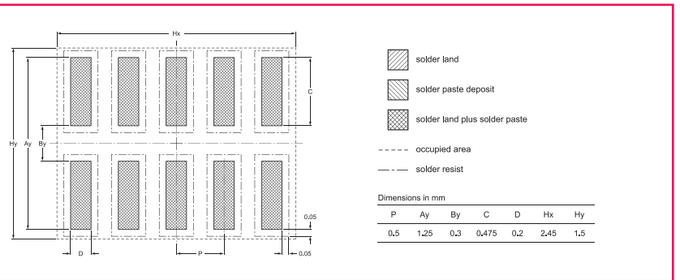
DFN2510-10 (SOT1165)



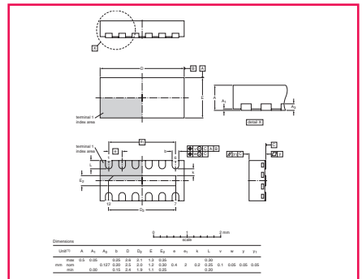
DFN2510-10 (SOT1165)



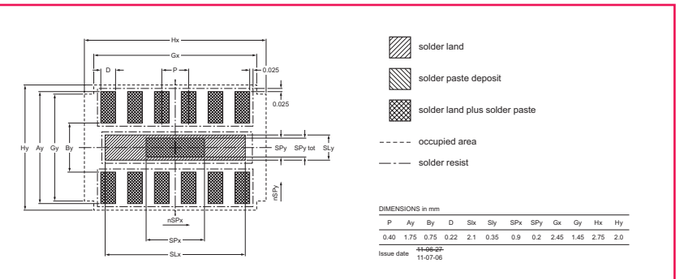
DFN2510A-10 (SOT1176)



DFN2510A-10 (SOT1176)



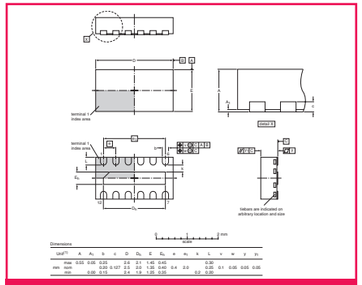
DFN2512-12 (SOT1158)



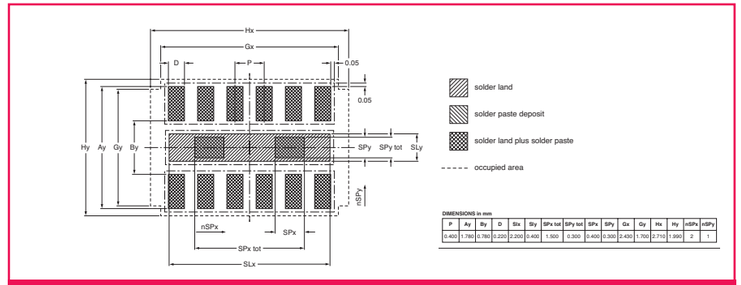
DFN2512-12 (SOT1158)

Dimensions in mm

More than 8-pin SMD packages



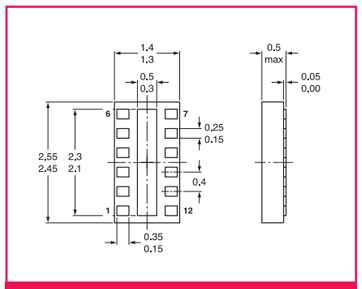
DFN2514-12 (SOT1167)



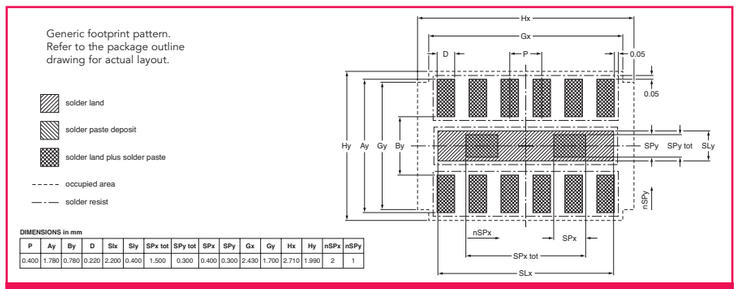
DIMENSIONS in mm

P	Ay	By	D	Stx	Sty	SPx tot	SPy tot	SPx	SPy	Gx	Gy	Hx	Hy	nSPx	nSPy
0.400	1.780	0.780	0.220	2.200	0.400	1.500	0.300	0.400	0.300	2.430	1.700	2.710	1.990	2	1

DFN2514-12 (SOT1167)



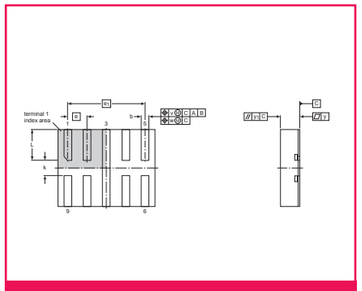
DFN2514U-12 (SOT984)



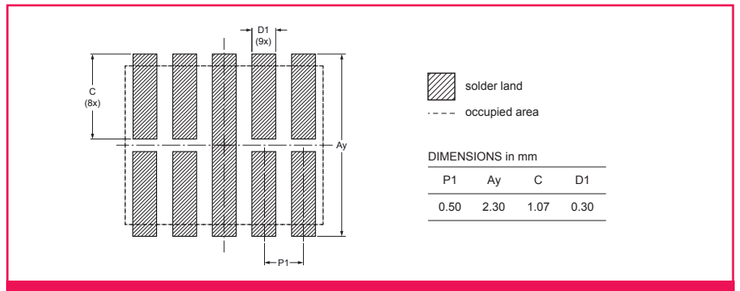
DIMENSIONS in mm

P	Ay	By	D	Stx	Sty	SPx tot	SPy tot	SPx	SPy	Gx	Gy	Hx	Hy	nSPx	nSPy
0.400	1.780	0.780	0.220	2.200	0.400	1.500	0.300	0.400	0.300	2.430	1.700	2.710	1.990	2	1

DFN2514U-12 (SOT984)



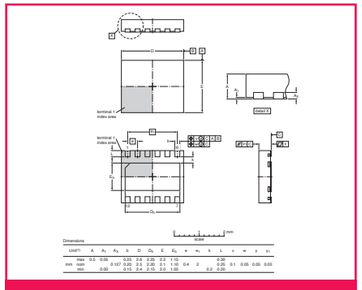
DFN2520-9 (SOT1333)



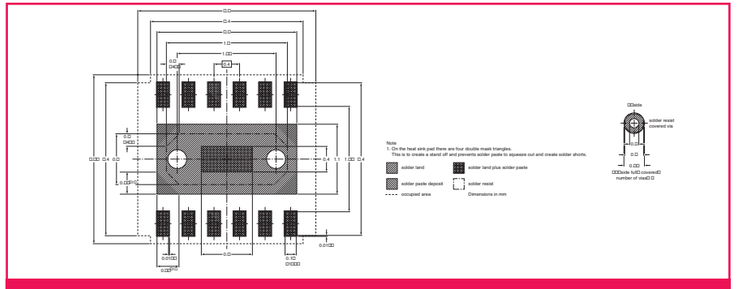
DIMENSIONS in mm

P1	Ay	C	D1
0.50	2.30	1.07	0.30

DFN2520-9 (SOT1333)



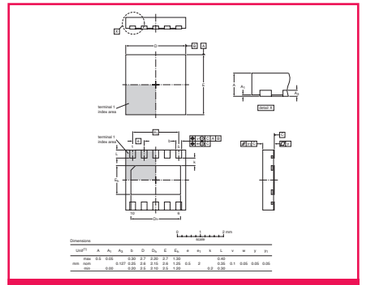
DFN2521-12 (SOT1156)



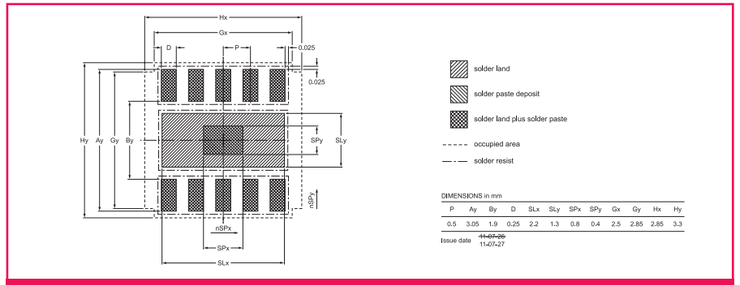
DFN2521-12 (SOT1156)

Dimensions in mm

More than 8-pin SMD packages



DFN2626-10 (SOT1197)

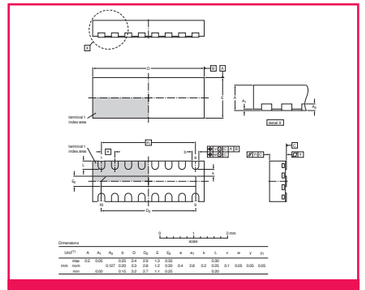


DIMENSIONS in mm

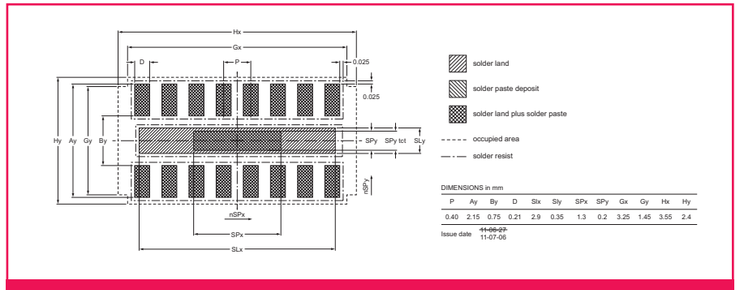
P	Ay	By	D	SLx	SLy	SPx	SPy	Gx	Gy	Hx	Hy
0.5	3.05	1.9	0.25	2.2	1.3	0.8	0.4	2.5	2.85	2.85	3.3

Issue date ~~11-07-25~~ 11-07-27

DFN2626-10 (SOT1197)



DFN3312-16 (SOT1159)

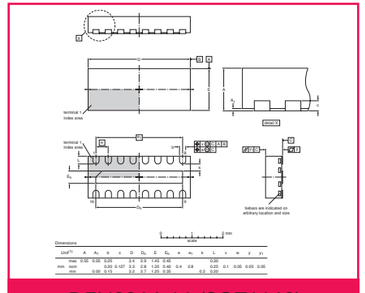


DIMENSIONS in mm

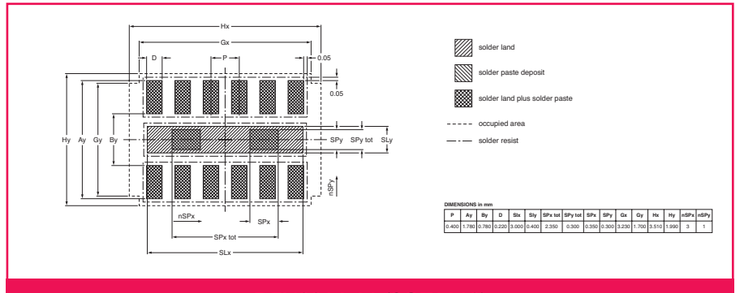
P	Ay	By	D	Stx	Sty	SPx	SPy	Gx	Gy	Hx	Hy
0.40	2.15	0.75	0.21	2.9	0.35	1.3	0.2	3.25	1.45	3.55	2.4

Issue date ~~11-06-27~~ 11-07-06

DFN3312-16 (SOT1159)



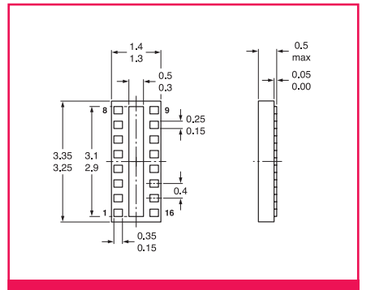
DFN3314-16 (SOT1168)



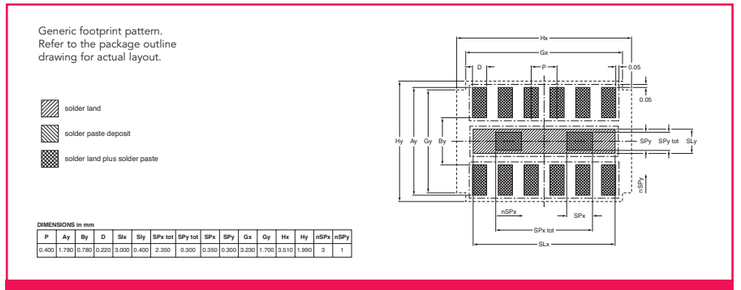
DIMENSIONS in mm

P	Ay	By	D	Stx	Sty	SPx tot	SPy tot	SPx	SPy	Gx	Gy	Hx	Hy	nSPx	nSPy
0.400	1.780	0.780	0.220	3.000	0.400	2.350	0.300	0.350	0.300	3.230	1.700	3.510	1.990	3	1

DFN3314-16 (SOT1168)



DFN3314U-16 (SOT985)



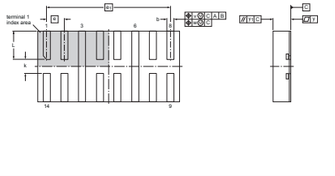
DIMENSIONS in mm

P	Ay	By	D	Stx	Sty	SPx tot	SPy tot	SPx	SPy	Gx	Gy	Hx	Hy	nSPx	nSPy
0.400	1.780	0.780	0.220	3.000	0.400	2.350	0.300	0.350	0.300	3.230	1.700	3.510	1.990	3	1

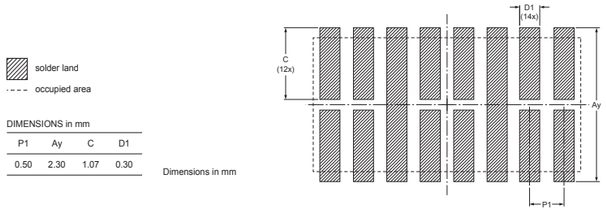
DFN3314U-16 (SOT985)

Dimensions in mm

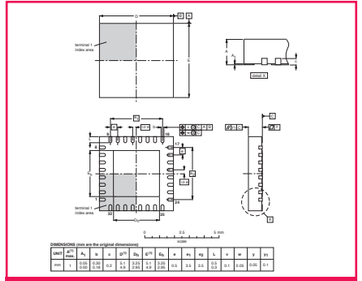
More than 8-pin SMD packages



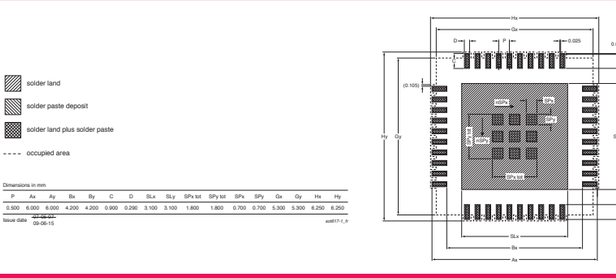
DFN4020-14 (SOT1334)



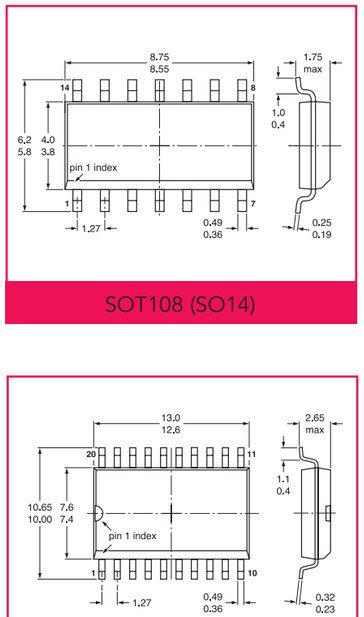
DFN4020-14 (SOT1334)



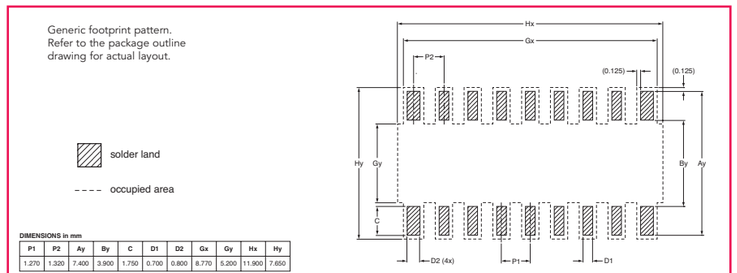
DFN5050-32 (SOT617)



DFN5050-32 (SOT617)

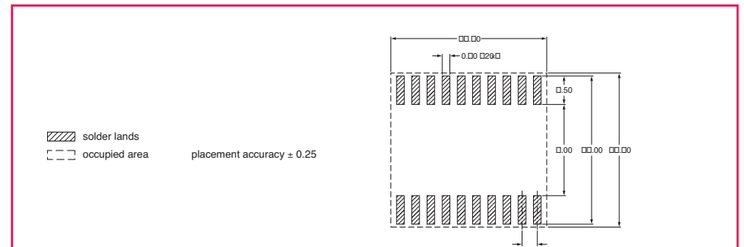


SOT108 (SO14)



SOT108 (SO14)

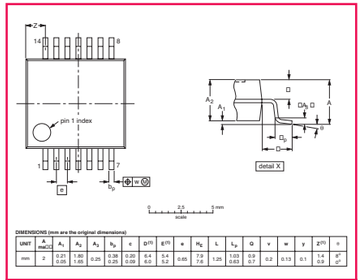
SOT163 (SO20)



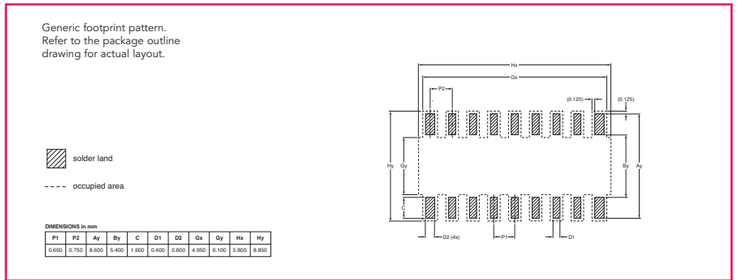
SOT163 (SO20)

Dimensions in mm

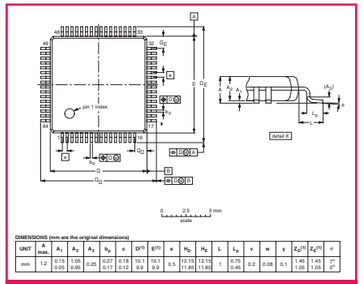
More than 8-pin SMD packages



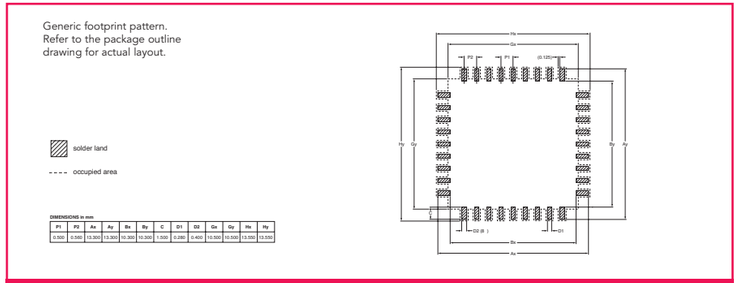
SOT337 (SSOP14)



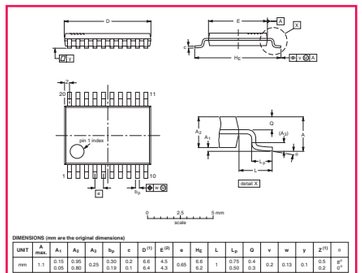
SOT337 (SSOP14)



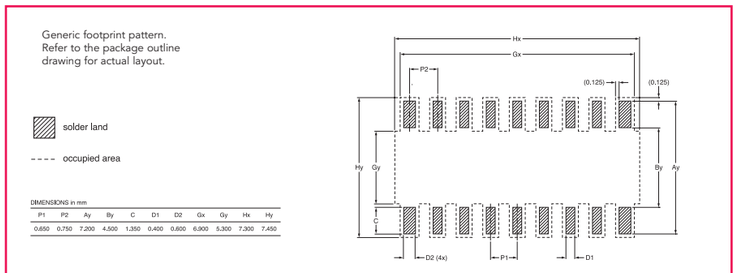
SOT357



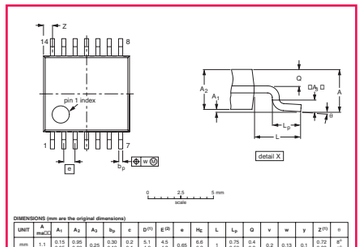
SOT357



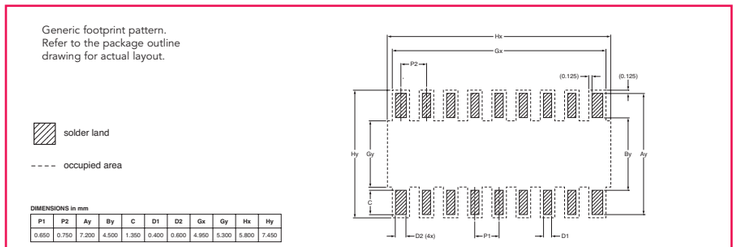
SOT360 (TSSOP20)



SOT360 (TSSOP20)



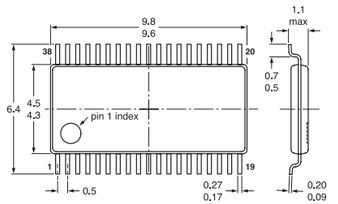
SOT402 (TSSOP14)



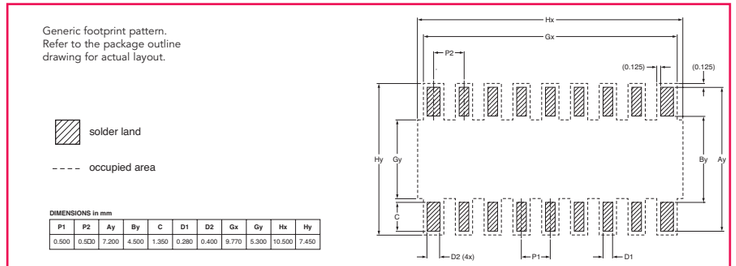
SOT402 (TSSOP14)

Dimensions in mm

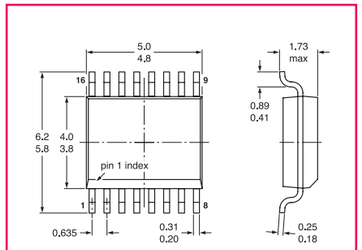
More than 8-pin SMD packages



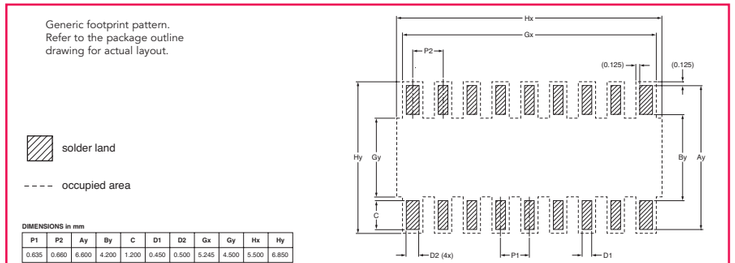
SOT510 (TSSOP38)



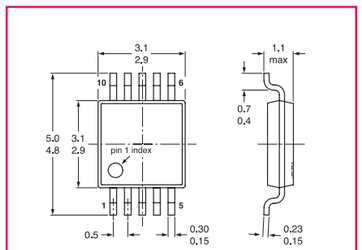
SOT510 (TSSOP38)



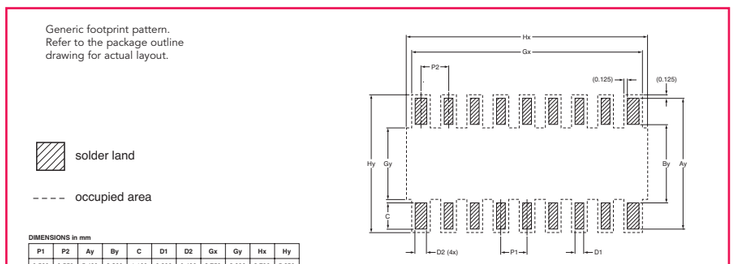
SOT519 (SSOP16)



SOT519 (SSOP16)



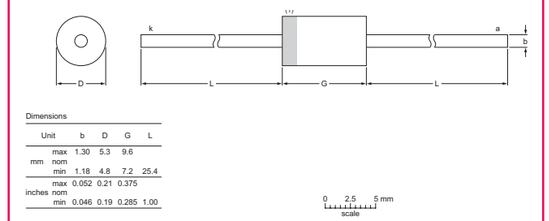
SOT552 (TSSOP10)



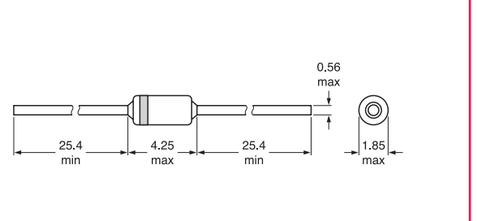
SOT552 (TSSOP10)

Dimensions in mm

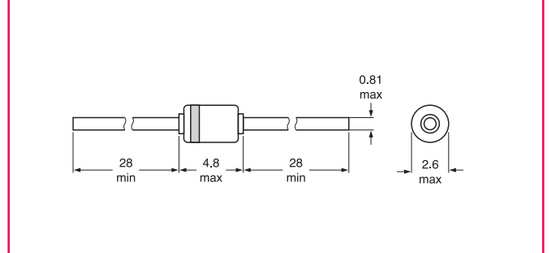
Glass diodes



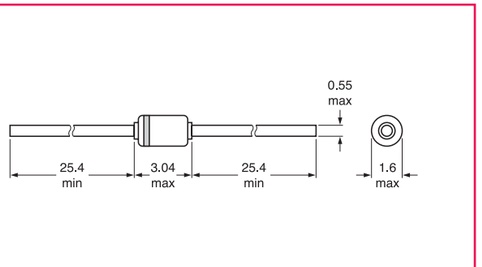
SOD141 (DO201AD)



SOD27 (DO-35)

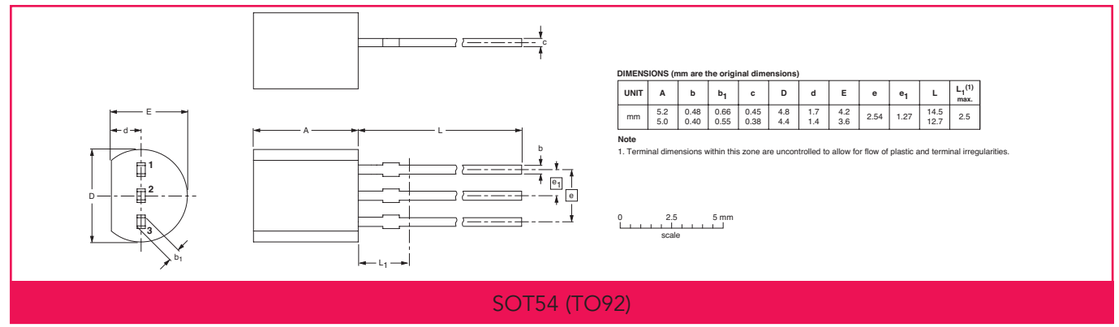


SOD66 (DO-41)

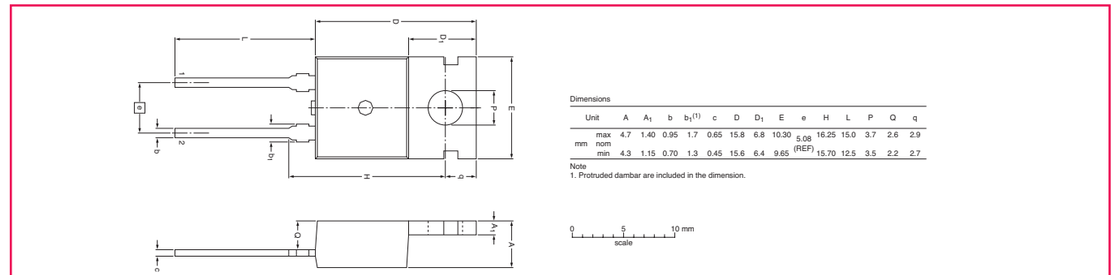


SOD68 (DO-34)

Single-ended and through-hole packages



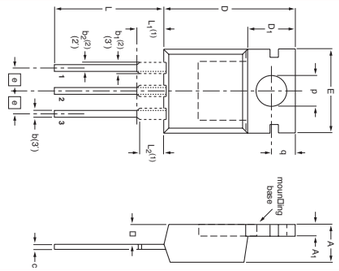
SOT54 (TO92)



SOD59

Dimensions in mm

Single-ended and through-hole packages



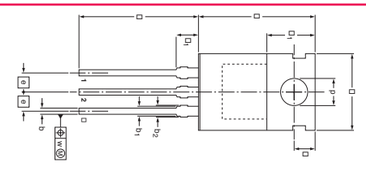
DIMENSIONS (mm are the original dimensions)

UNIT	A	A_1	b	b_1[2]	b_2[2]	c	D	D_1	E	e	L	L_1[1]	L_2[1] max.	p	q	Q
mm	4.7 4.1	1.40 1.25	0.9 0.6	1.6 1.0	1.3 1.0	0.7 0.4	16.0 15.2	6.6 5.9	10.3 9.7	2.54	15.0 12.8	3.30 2.79	3.0	3.8 3.5	3.0 2.7	2.6 2.2

Notes
1. Lead shoulder designs may vary.
2. Dimension includes excess dambar.

0 5 10 mm
scale

SOT78 (TO220AB)

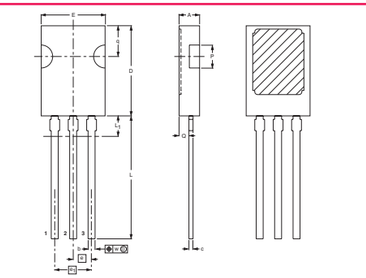


DIMENSIONS (mm are the original dimensions)

UNIT	A	A_1	b	b_1	b_2	c	D	D_1 ref	E	e	L	L_1 ref	p	Q	q	w
mm	4.7 4.3	1.40 1.25	0.9 0.6	1.4 1.1	1.72 1.32	0.6 0.4	16.0 15.2	6.5	10.3 9.7	2.54	14.0 12.8	3.0	3.7 3.5	2.6 2.2	3.0 2.7	0.2

0 5 10 mm
scale

SOT78D



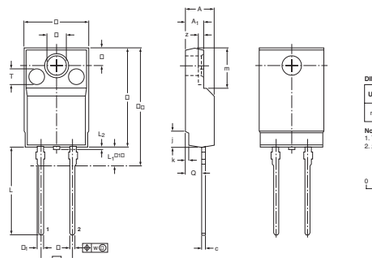
DIMENSIONS (mm are the original dimensions)

UNIT	A	A_1	b	b_1	c	D	E	e	e_1	L	L_1[1]	P	Q	q	w
mm	2.8 2.3	0.88 0.65	0.58 0.47	11.1 10.5	7.8 7.2	2.29	4.58		16.5 15.3	2.54	3.1 2.5	1.5 0.9	3.9 3.5	0.254

Note
1. Terminal dimensions within this zone are uncontrolled to allow for body and terminal irregularities.

0 2.5 5 mm
scale

SOT82



DIMENSIONS (mm are the original dimensions)

UNIT	A	A_1	b	c	D	E	e	H_E max	j	k	L	L_1[1]	L_2 max	m	P	Q	q	T	w
mm	4.6 4.0	2.9 2.5	0.9 0.7	0.7 0.4	15.8 15.2	10.3 9.7	5.08	19.0	2.7 1.7	0.6 0.4	14.4 13.5	3.3 2.8	0.5	6.5 6.3	3.2 3.0	2.6 2.3	2.6	2.55	0.4

$p^{(2)}$
0.8

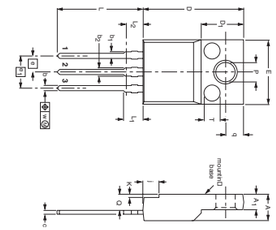
Notes
1. Terminals are uncontrolled within zone L_1.
2. z is depth of T.

0 10 20 mm
scale

SOD113

Dimensions in mm

Single-ended and through-hole packages



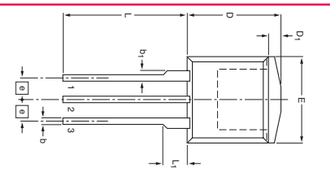
□□□□N□□□N□□□□□□□□e□□e□e□□□□□□□□□□e□s□e□s□

□N□□	□	$□_1$	□	$□_1$	$□_2$	□	□	$□_1$	□	e	e_1	□	□	□	$□_1$	□□	$□_2$	□	□	□	□	□	□
mm	□□ □□	2.□ 2.5	0.□ 0.□	1.1 0.□	1.□ 1.0	0.□ 0.□	15.8 15.2	□.5 □□	10.□ □□	2.5□	5.08	2.□ 1.□	0.□ 0.□	1.□□ 10.5	□.□0 2.□□	□	□.2 □.0	2.□ 2.□	□.0 2.□	2.5	0.□		

Notes
1. Terminal dimensions within this zone are uncontrolled.
2. Both recesses are Æ 2.5 ´ 0.8 max. depth

0 5 10 mm
scale

SOT186A (isolated TO220AB)

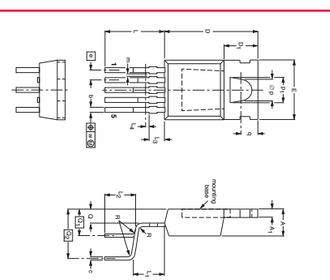


DIMENSIONS (mm are the original dimensions)

UNIT	A	A_1	b	b_1	c	D	D_1 max	D_1	E	e	L	L_1	Q
mm	4.5 4.1	1.40 1.27	0.85 0.60	1.3 1.0	0.7 0.4	11		1.6 1.2	10.3 9.7	2.54	15.0 13.5	3.30 2.79	2.6 2.2

0 5 10 mm
scale

SOT226

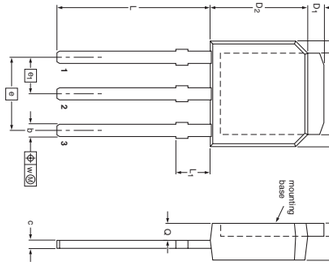


DIMENSIONS (mm are the original dimensions)

UNIT	A	A_1	b	c	D_1	D_2	E	E_1	e	e_1	L	L_1[2] max.	Q	w
mm	4.5 4.1	1.39 1.27	0.85 0.70	0.7 0.4	15.8 15.2	6.4 5.9	10.3 9.7	1.7	9.8 9.7	5.9 5.3	5.2 5.0	2.4 1.6	0.5	0.8 0.6	3.8 3.6	4.3 4.1	3.0 2.7	2.0	4.5	8.2	0.5	0.4

0 5 10 mm
scale

SOT263B-1



DIMENSIONS (mm are the original dimensions)

UNIT	A	A_1	b	c	D_1	D_2	E	E_1	e	e_1	L	L_1[2] max.	Q	w
mm	2.38 2.22	0.93 0.46	0.89 0.71	0.56 0.46	1.10 0.96	6.22 5.98	6.73 6.47	5.21 5.00	4.57 BSC[1]	2.285 BSC[1]	9.6 9.2	2.7	1.1 1.0	0.3

Notes
1. Basic spacing between centers.
2. Terminal dimensions are uncontrolled within zone L_1.

0 2.5 5 mm
scale

SOT533

Dimensions in mm

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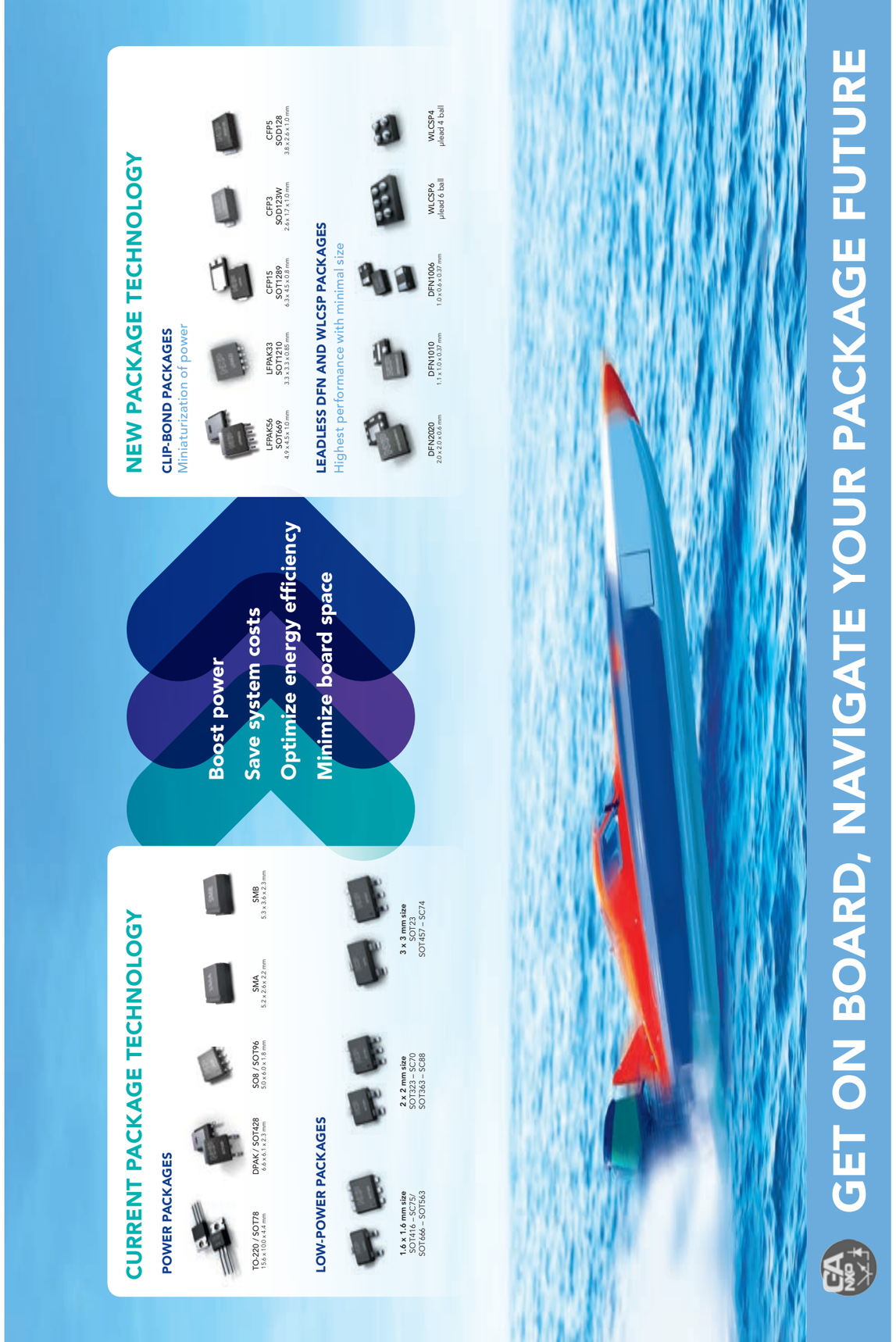

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